The Role of Deliberate Practice in Developing Adolescent Golfing Excellence

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ABSTRACT

The acquisition of expert performance has been studied for decades across a range of human performance domains. Ericsson, Krampe, and Tesch-Römer (1993) proposed a theoretical framework termed the theory of deliberate practice to account for the characteristics and developmental experiences of individuals who acquire exceptional levels of performance in any discipline. This theory proposes that acquiring expertise across any domain is the result of undertaking an extensive acquisition period of approximately ten years involving the accumulation of thousands of hours of physically and mentally demanding practice regimes whilst overcoming effort, motivational and resource constraints that serve as barriers to the attainment of elite performance. Therefore, this thesis aimed to contribute to the under researched area of golf development systems by examining the applicability of deliberate practice theory in acquiring elite male adolescent golfer status.

The first study, of four, utilised self-report diary logs to reveal the durations, types and intensities of golf activities undertaken by nine aspiring elite adolescent golfers over a nine month period and compared actual and retrospective accounts. In total, 62 percent of all golf activities were classified as either golf competitions or competitive practice rounds undertaken with high amounts of physical and mental effort and fun. This approach to development was beneficial for lowering the golf handicaps of several participants. Results reveal the performance improvements which aspiring elite adolescent golfers experienced whilst engaging with regular golf competitions and practice rounds instead of deliberate practice specific activities. However, such improvements did plateau once performers reached a handicap approaching two. Retrospective recall was also revealed as an accurate method to determine volumes and conditions of golf activities undertaken over a nine month period. Non-significant differences were revealed between actual and recalled data (training volumes $p = 0.94$, physical effort $p = 0.83$, mental effort $p = 0.44$, and fun $p = 0.13$) and effect sizes were small ranging ($d = 0.03 – 0.31$)

The second study retrospectively examined the sports participation and practice trends of current elite adolescent male English golfers. It was found how these individuals tended not to participate within golf specific deliberate practice regimes until the mid-teenage years and instead encountered a diversified introduction to several sports, which included golf, within a playful, fun, non-competitive environment that resembled key tenets of deliberate play theory (Côté, 1999). A change in emphasis towards on-going golf development occurred around the age of 16 when exposure with golf specific deliberate practice became more evident once participants had gained selection for county and English Golf Union representative golf teams.

The third study used interpretative phenomenological analysis to explore the experiences of golfers who had all successfully travelled the path from novice to elite adolescent golfer status. Four super-ordinate themes emerged from participants accounts which revealed how elite adolescent golfers experienced supportive parents and a diversified enjoyable introduction to a range of sports. This was followed by a self-determined commitment to golf in the mid teenage years and a strategic approach to developing excellence which recognised the important role that psychology may play post 16 years of age.

The forth study aimed to discover if the introduction of a golf specific deliberate practice intervention would improve putting performance and influence future practice behaviours of five aspiring elite adolescent golfers who had no prior experience of specialised golf training protocols. Participants completed a 13 week AB single-subject multiple-baseline design, social validation measures and five month follow up interviews. Mean putting performance was significantly higher ($t_4 = 6.94$, p = .002, d = 3.12) in the intervention phase (M = 6.20, SD = 0.51) than the baseline phase (M = 4.64, SD = 0.57). All participants enjoyed undertaking deliberate practice, experienced a range of psychological and technical improvements, adapted current training schedules to mirror deliberate practice and committed long term to activities of this nature.

In conclusion, the findings of the four empirical studies within this thesis suggest long term deliberate practice is not a pre-requisite throughout childhood and the early teenage years for securing selection within international adolescent golf squads. However, engagement in deliberate practice post 16 years of age was found to be an important training strategy for the continued performance development of emerging and elite level adolescent golfers. The pathway to elite adolescent status more closely resembled Côté's (1999) deliberate play theory with sampling during early childhood, specialising during early teenage years, and investment in later teenage years. The collective findings of this thesis may provide players, coaches, applied sport psychologists and policy makers involved within golf talent development systems with clearer insights into conditions of participation and practice that appear optimal for achieving adolescent golfing excellence.

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DEFINITION OF TERMS

Golf

Golf is a precision club and ball sport played on nine or 18 hole courses. Players use a variety of clubs to hit the ball into a series of holes on the course with the intention of using the lowest number of strokes possible.

Expert Performance Approach

A three stage approach proposed by Ericsson and Smith (1991) for understanding and enhancing coaching performance, expertise and learning (see Ericsson, 2003 & Ford, Coughlan, & Williams, 2009 for an overview).

Deliberate Practice

A highly organized activity that requires maximal physical and mental effort and is characterised by activities that are designed specifically to improve skill acquisition and performance rather than for inherent enjoyment (Ericsson et al., 1993).

Acquisition Period

The approximate period of time which research suggests should be spent undertaking deliberate practice activities (approximately ten years or 10,000 hours) in order to achieve expert status across any human endeavour (Ericsson et al., 1993).

Inherent Enjoyment

A term used to describe a participants enjoyment at undertaking a particular activity. Whilst the original deliberate practice framework inferred that experts do not encounter inherent enjoyment during practice (Ericsson et al., 1993), the findings of sport specific research have revealed how expert sports performers do encounter inherent enjoyment

during highly structured and effortful practice regimes (e.g., Helsen, Starkes, & Hodges, 1998).

Relevance

A term used to describe the importance of undertaking a particular activity when improving existing performance levels and acquiring expert status is an individual's primary goal (Ericsson et al., 1993).

Physical Effort

A term used to describe the importance of undertaking adequate volumes of physically effortful practice on a daily basis when improving existing performance levels and acquiring expert status is an individual's primary goal (Ericsson et al., 1993).

Mental Effort

A term used to describe the importance of undertaking adequate volumes of mentally effortful practice on a daily basis when improving existing performance levels and acquiring expert status is an individual's primary goal (Ericsson et al., 1993).

Monotonic Benefits Assumption

The assumption that the participant who achieves both the greatest improvements and highest levels of performance will have ultimately accumulated the largest amount of time spent undertaking deliberate practice activities (Ericsson et al., 1993).

Stages of Learning Model

An approach to learning which proposes how participants progress through three specific stages of skill acquisition termed cognitive, associative and autonomous as they

practice a skill and learn to perform it independently. The cognitive stage is time demanding and characterised by large amounts of cognitive effort, conscious processing and high levels of explicit verbal instruction and augmented feedback. In the associative phase, performers adjust and gradually improve how the skill is performed until movements are more consistent and spontaneous. Learners finally progress into the autonomous phase where the skill is performed automatically and greater volumes of practice are required to achieve smaller gains (Fits & Poster, 1967).

Deliberate Play

An approach which seeks to nurture sporting excellence within a diversified, fun, athlete centred and intrinsically motivating learning environment throughout childhood and the early teenage years whilst considering the importance of both physical training and psycho-social resources being aligned with the needs of participants at various stages of their development (Côte, 1999).

Elite Adolescent Golfers

The term used to define the sample of high performing adolescent male golfers used in studies two and three who were all current members of representative teams sanctioned by the English Golf Union (EGU).

Aspiring Elite Adolescent Golfers

The term used to define the sample of county level male adolescent golfers used in studies one and four who were all full time Advanced Apprenticeship in Sporting Excellence (AASE) students at a further education institution based in Northern Englan

CHAPTER 1

INTRODUCTION

1.1 The Development of Sporting Excellence

Exceptional levels of performance have been documented in a wide range of human performance domains (Ericsson & Smith, 1991). Expertise in sport is highly prized and world-class sports performers have captured the attention of global audiences for decades. As a consequence, reaching elite status is a major life purpose for many athletes who commit years towards achieving this accolade (Abbott, Collins, Martindale, & Sowerby, 2002; Stambulova, 2009; Vaeyens, Gullich, Warr, & Philippaerts, 2009).

The nature of the training activities undertaken throughout a sport performers development is a matter that has implications for achieving both expert status and retaining long term involvement in sport and physical activity (Côté & Fraser-Thomas, 2007). Over the past decade, several reviews of mainstream and sport specific expertise research have revealed how the content and structure of practice regimes undertaken by elite performer populations have evolved over time (e.g., Ericsson, Charness, Feltovich, & Hoffman, 2006; Starkes & Ericsson, 2003). One of the major interests of talent development researchers in recent years has been the efforts to identify significant factors that contribute towards the attainment of eventual excellence in sport (Williams & Ericsson, 2008) as illustrated by the publication of many edited books (e.g., Baker, Cobley, & Schorer, 2012; Ericsson et al., 2006; Farrow, Baker, & MacMahon, 2008; Jonker, 2011; Starkes & Ericsson, 2003, Williams & Hodges, 2004;) and journal articles (e.g., Baker & Côté, 2006; Ericsson, 2007a; Williams & Ford, 2008). The overarching finding from these publications is the understanding how aspiring elite sports

performers must undertake appropriate and extensive amounts of practice if they are to bridge the gap between themselves and expert performance.

1.2 Foundations of Deliberate Practice Theory

Although researchers have long been captivated by superior performance (Ericsson et al., 2006), it was not until the application of a structured approach that knowledge in this area began to flourish (Williams & Ericsson, 2005). Ericsson and Smith (1991) proposed a three stage framework for the study of expertise which they referred to as the Expert Performance Approach (see Ericsson, 2003, for an overview). This approach suggested how the nature of expert performance should be initially captured in a laboratory setting using representative tasks that identify reliably superior performance. In the second stage, process-tracing measures are then employed to determine the mechanisms that mediate expert performance on the task and finally, the specific types of activities that lead to the acquisition and development of these mediating mechanisms are identified in the third stage. A criticism of this approach was how the final stage was not as well defined as the first two by Ericsson and Smith (1991). However, the research by Ericsson, Krampe, and Tesch- Römer (1993) elaborated on the nature of the acquisition processes underpinning expert performance by forwarding a framework for developing excellence which accounted for characteristics and developmental experiences of individuals who had acquired exceptional levels of performance in music.

This framework was grounded in the research undertaken by Simon and Chase (1973) and situated within a cognitive framework for examining motor learning (henceforth, this framework will be referred to as *deliberate practice theory*). The theory suggested expertise is the product of extensive engagement within "deliberate practice" and

superior performance levels are achieved by those individuals who undertake the greatest volumes of this specialised form of training, whilst overcoming motivational, effort and resource constraints that may serve as barriers to the attainment of expert status (Ericsson et al., 1993; Ericsson & Lehmen, 1996; Howe, Davidson, & Sloboda, 1998; Howe, Davidson, Moore, & Sloboda, 1995; Sloboda, Davidson, & Howe, 1994).

Deliberate practice requires maximal physical and mental effort as is characterised by activities that are designed specifically to improve skill acquisition and performance rather than for inherent enjoyment. The theory implies how any healthy individual who encounters an acquisition period of approximately 10,000 hours of deliberate practice over a period of roughly ten years in any given field can achieve expert status (Ericsson et al., 1993) and is based on the principle that environmental factors including amounts and types of practice undertaken are more influential than any innate factors in developing expertise. Ericsson et al., (1993) also proposed how physiological and anatomical characteristics, thought historically to be fixed, may essentially be adaptable but only as a result of long term exposure with training protocols underpinned by deliberate practice whilst Ericsson and Lehmen (1996, p.281) stated how "the influence of innate, domain specific capacities on expert performance is small, possibly even negligible." In summary, the research undertaken by Ericsson and associates over the past two decades claims the contribution of innate characteristics towards the attainment of expertise is nominal and suggests how differences in the performances of experts and non-experts across a range of performance domains may be explained by total amounts of deliberate practice undertaken throughout their careers.

Ericsson and colleagues have also emphasised how simply practicing for an extensive period of time will not automatically result in the achievement of expertise. Instead,

they have stressed how practice activities must fit key criteria of deliberate practice theory in that this type of training should not necessarily be fun to undertake, must be highly relevant to developing excellence, requires optimal resources, sustained levels of physical effort and concentration and should not be completed under conditions of fatigue or low motivation (Ericsson et al., 1993). They have also emphasised the importance of increasing the complexity and challenge of deliberate practice activities, so aspiring elite performers remain cognitively engaged within every prescribed training session they undertake. They state this approach to learning enables the performer to offset automaticity of performance and remain in the cognitive and associative instead of autonomous stages of learning (Fitts & Postner, 1967), thus allowing for the continued modification of cognitive mechanisms that mediate how the brain and nervous system control motor performance (Ericsson et al., 2007a). Ericsson (2006, p.692) also stated "the requirement for concentration sets deliberate practice apart from both mindless, routine performance and playful engagements as the latter two types of activities would merely strengthen the current mediating mechanisms, rather than modify them to allow increase in the level of performance".

Although the principle aim of deliberate practice is to improve existing levels of performance by focusing on areas of weakness, this form of training also places equal standing on quality and quantity of practice, promotes self-coaching, independence of learning and encourages performers to work beyond their current level of performance and comfort zone (Ericsson et al., 1993; Ericsson, 2007a). The applicability of this theory, which has been examined across many disciplines including music, chess, medicine and sport over the past two decades, has revealed a monotonic relationship between accumulated hours of deliberate practice and performance levels attained (Ericsson et al., 2006). In other words, the theory proposes how the individual who

ultimately achieves both the greatest improvements and highest levels of performance will have accrued the largest amount of deliberate practice. Ericsson's contribution to the expertise literature base is also unique because it has revealed the significance of both quantity and quality of practice upon motor skill development where a criticism of previous expertise research (e.g., Simon & Chase, 1973) was the tendency to focus primarily on the total quantity and neglected the quality of practice undertaken by expert performers and how performance improvements encountered by this approach may be linear and not a power function (Baker & Cobley, 2008).

A number of possible explanations have been provided for superior performance following deliberate practice. These include improved accuracy and speed of performance upon a range of cognitive, perceptual and motor tasks including visual cue utilization, pattern recall and recognition, anticipation, decision making and visual search behaviour. For example, research undertaken by Savelsbergh, van der Kamp, Williams, and Ward (2002) revealed how skilled footballers demonstrated a superior ability to pick up advance visual information from a teammates or opponents postural orientation prior to a key event. Research has also confirmed how expert handball and soccer performers respectively outperformed their non-expert counterparts in sport specific pattern recognition and recall tasks (Tenenbaum, Levy-Kolker, Sade, Liebermann, & Lidor, 2006; Williams, Hodges, North, & Barton, 2006).

In summary, the deliberate practice approach to expertise development recommends that it is not only sheer volumes of practice that prove critical to whether or not expertise is acquired, but also the type of such provision. In fact, Ericsson has also stated how the quality instead of quantity of deliberate practice may be of more importance in the attainment of expertise (Ericsson, 2007a) and high quality deliberate

practice has the same impact upon motor learning regardless of whether the aspiring elite performer is undertaking their first or 10,000th hour of deliberate practice training (Ericsson et al., 2006; Ericsson, 2007a).

1.3 Theoretical Approaches to Motor Learning

The skill acquisition literature contains a range of cognitively focussed learning theories which outline and explain the progressive nature of motor learning development from novice to elite levels of performance in any given domain. Examples of well-established cognitive theories of motor learning include the stages of learning model (Fitts & Postner, 1967) and the power law of practice (Anderson, 1983; Newell & Rosenbloom, 1981). The research undertaken by Fitts and Posner (1967) led them to suggest that the learning process is a progressive entity and any individual will pass through specific phases of development as they acquire new motor skills. The power law of practice theory claims motor learning occurs initially at a rapid rate after the onset of practice but that this rate of learning decreases over time as skill levels improve. This theory is supported by research across different learning behaviours which has examined choosing the correct response when posed with a range of optional choices (Seibel, 1963) to activities including rolling cigars (Crossman, 1959).

A collective feature of these cognitive approaches to motor learning is the suggestion that learning is a steady process whereby learner`s progress through three specific phases of skill acquisition termed cognitive, associative and autonomous stages as they practice a skill and learn to perform it independently (Anderson, 1982, 1983; Fitts & Posner, 1967; Schmidt & Lee, 2005; Shiffin & Shneider, 1977). In the cognitive phase, learners try to understand what needs to be done to execute the skill. Their focus is on performing the task accurately and they benefit from specific feedback to guide their

movements. This stage of learning is time demanding and characterised by large amounts of cognitive effort, conscious processing and high levels of explicit verbal instruction and augmented feedback. In the associative phase, performers adjust and gradually improve how the skill is performed until movements are more consistent and spontaneous. After an extensive acquisition phase, learners finally progress into the autonomous phase where the skill is performed automatically and greater volumes of practice are required to achieve smaller gains (Farrow, 2012; Schmidt & Lee, 2005).

It is well established how quantity and quality of practice are crucial to the development of expertise and teachers and coaches should carefully consider the micro-structure of practice sessions to maximise learning opportunities (Davids, 2000; Deakin & Cobley, 2003; Ericsson, 2003 & Starkes, 2003). In emphasising this point, Farrow (2012, p.57) stated "practice should be a continual striving to lift performance to a new skill level such that plateaus in learning do not occur." Opposing the frameworks of traditional theories of skill acquisition (e.g., Fitts & Posner, 1967), deliberate practice theory suggests the most critical aspects of expert performance are not fully automated and the expert performer retains control over them during performance. To emphasise, Ericsson and Lehmann (1996) proposed how ensuring aspiring elite performers maintain high levels of conscious monitoring and control during skill acquisition is essential for further improvement of a skill through deliberate practice. Therefore, once a consistency in performance is evident, current training protocols would no longer be considered as deliberate practice and a performer must undertake a revised practice schedule that falls beyond the individual`s current competency levels and requires increased levels of physical and mental effort and conscious control.

There has been an on-going debate within the motor learning literature for many years regarding the role of explicit and implicit processes in developing levels of motor learning and performance (Masters, 2000; Masters & Maxwell, 2004). A collective characteristic of traditional cognitive theories of motor learning is the assumption that novice performers rely heavily upon explicit learning methods as they learn to master a new skill (Masters, 2008). Explicit approaches to motor learning involve directing the attention of individuals toward specific learning in a highly structured environment comprising extensive coach led explanation and demonstration (Masters, 2008; Orrell, Eves, & Masters, 2006). Coaches have relied heavily in the past on explicit, highly conscious prescriptive approaches (e.g., providing regular instruction and feedback) to develop the learning of their athletes (Williams & Hodges, 2005) and whilst these methods may generate relatively rapid short term improvements in performance, research has revealed how ensuing performance is susceptible to breakdown under competition pressure (Masters, 1992, 2008).

An alternative approach to developing learning is to use implicit motor learning approaches in which adaptations to performance occur through guided discovery learning without conscious knowledge of underlying rules (Rendall, Farrow, Masters, & Plummer, 2011). Reber (1993, p.5) defined implicit learning as "the acquisition of knowledge that takes place largely independently of conscious attempts to learn and largely in the absence of explicit knowledge about what was acquired." The work by Masters and associates in recent years using dual tasks (Masters, 1992), errorless practice (Maxwell, Masters, Kerr, & Weedon, 2001) and feedback prevention (Maxwell, Masters, & Eves, 2003) has revealed a range of long term performance benefits for learning motor skills implicitly. Therefore, implicit approaches to motor learning may promote greater opportunities for athlete guided, discovery learning that is

less likely to breakdown under pressure or be forgotten, when compared with explicit approaches to motor learning such as deliberate practice (Côté & Fraser-Thomas, 2008; Masters, 2008), although this assumption has yet to be tested to date.

An implicit approach to motor skill development closely resembles the theoretical framework of deliberate play theory (see Côté, 1999 for an overview). This theory opposes key tenets of deliberate practice as an effective strategy for developing sporting excellence during the early stages of an individual's sporting career. Instead, this approach encourages both elite and recreationally focused performers to undertake large amounts of playful, experimental activities throughout their childhood and early teenage years based on the assumption that undertaking excessive amounts of structured, effortful sport specific deliberate practice, particularly during early childhood and adolescence, may increase the likelihood of youth sport dropout, overtraining and burnout (Carlson, 1988; Gould, Tuffey, Udry, & Loehr, 1996a; Wall & Côté, 2007) and higher rates of injury (Law et al., 2007) in the long term. As an alternative, Côté and colleagues suggested how creating environments to learn through exposure with games and activities which are fun, enjoyable, athlete centred and intrinsically motivating may have the combined effect of developing interest and passion for sport whilst also refining the physical, technical, tactical and psychological skills needed for success in the long term (Bloom, 1985; Côté et al., 2007; Côté & Fraser-Thomas, 2008). Indeed, a key tenet of deliberate play theory is not only to develop physical capabilities and motor learning but also perceptions of competence which may lead to long term motivation and continued participation within the sport (Côté & Fraser-Thomas, 2008). Overall, the theory of deliberate play theory provides a framework for nurturing sporting excellence which considers the importance of both physical training and psycho-social resources being aligned with the needs of the athletes at various stages of development.

Another approach considered to be appropriate for explaining how sporting excellence is best achieved is the dynamical systems theory which suggests motor learning is developed through interactions between specific individual, task and environmental constraints which interact with each individual in a unique manner, resulting in varied developmental pathways (see Newell, 1986 for an overview). The theoretical underpinnings of this theory are based on the principle that the attainment of excellence in sport is a non-linear, flexible process where the individual is a sub-component of a complex system (Davids, Button, & Bennett, 2008; Phillips, Davids, Renshaw, & Portus, 2010a, 2010b). Renshaw, Davids, Phillips, and Kerherve (2012, p.64) proposed that "sports performance evolves as an emergent dynamic system where the performance landscape is constantly shifting." In agreement with deliberate play theory, Davids et al., (2008) and Renshaw et al., (2012) further discussed how future talent development models should be encouraged to incorporate an athlete centred approach to learning which encourages highly adaptive individuals to partake in self-guided discovery learning of generic and sport specific skills from a young age, instead of prescriptively coached, dependent learning environments which may leave individuals unable to deal with changes in interacting environmental, task and individual constraints.

1.4 Deliberate Practice Theory and the Development of Musical Excellence

The primary research undertaken by Ericsson et al., (1993) into deliberate practice used retrospective questionnaires and self-report diary logs to reveal the staple behaviours that could explain the individual skill differences of highly skilled violinists and pianists based at the Berlin Music Academy. Participants rated on a scale of one (low) to ten (high) all the daily and practice related activities undertaken on the dimensions of effort, enjoyment and relevance to performance improvement. Activities which were revealed

to be significantly higher than the grand mean scores across all activities for effort and relevance were categorised as deliberate practice. In total, seven of the 12 music related activities which comprised practice alone, practice with others, taking lessons, solo performance, group performance, listening to music and music theory were rated significantly higher in terms of relevance and effort although a significant rating for enjoyment was also obtained for group performance. Only two activities obtained significantly higher ratings for everyday activities which were sleep (relevance) and leisure (enjoyment). Overall, practice alone was characterised as being the only activity undertaken by the musicians which met the deliberate practice criteria of being highly effortful and relevant but not necessarily pleasurable.

The study also revealed how the number of hours spent undertaking deliberate practice activities (e.g., practice alone) differed consistently between the three separate levels of musicians. Estimates from the two superior groups of skilled violinists revealed they undertook an average of 24.3 hours per week in practice alone throughout their careers in comparison to 9.3 hours for music teachers. The mean length of practice sessions across groups was also very similar which reinforces the theory how skill based differences between musicians were a direct result of the number of deliberate practice sessions undertaken. Estimations of previous training trends revealed how the international violinists at the academy had amassed a significantly greater volume of deliberate practice than the national violinists and the music teachers after ten years. The practice trends of expert and amateur pianists were also very similar to the findings of the violinists. Experts undertook on average 26.7 hours per week of solitary deliberate practice and had accumulated 7606 hours of deliberate practice by the age of 18 (14 years into their career`s) which was approximately 6000 hours (or approximately 11.5 per week over ten years) greater than the amateur participants.

Overall, his study revealed how all musicians categorized as experts within the Ericsson et al., (1993) study undertook at least 10,000 hours of solitary deliberate practice over an acquisition period of ten years to achieve expertise.

1.5 Deliberate Practice Constraints

The initial research by Ericsson et al., (1993) also acknowledged how any individual intent on achieving elite status must overcome several constraints throughout the ten year acquisition period that may hold them back during their quest for on-going improvements in motor skill development. Firstly, the effort constraint describes the importance that an aspiring expert must possess both the competency and willingness to devote high levels of mental and physical effort throughout every practice session. The demanding and intensive nature of deliberate practice also means it may only be sustained for limited periods before the performer becomes fatigued and an overemphasis on highly effortful deliberate practice without appropriate rest and recovery periods may lead to performance plateaus. This led Ericsson et al., (1993) to recommend the maximum amount of time that may be spent undertaking deliberate practice regimes on a daily basis should be approximately four hours for individuals with long term experience of deliberate practice and as little as 20 minutes for inexperienced participants.

Secondly, the motivation constraint emphasises the importance that an aspiring expert must be highly motivated at all times throughout the acquisition period to dedicate the time and effort required to undertake deliberate practice regimes that are defined as highly effortful and not inherently enjoyable. The motivation to engage in deliberate practice activities must also be focused towards the improvement of existing performance levels and not for financial or social rewards. Finally, the resource

constraint highlights the importance of acquiring access to optimal resources including training materials and facilities considered critical for the on-going development of the aspiring elite performer. Importantly, Ericsson et al (1993) did suggest this constraint may be overcome by the influential roles undertaken and support provided by parents in the form of transportation and pastoral and financial support.

1.6 Sport Domain Contributions to Deliberate Practice Theory

The theory of deliberate practice claims the attainment of expertise within any given field is only possible after undertaking a minimum of 10,000 hours or ten years exposure with specialised highly effortful training regimes. Ericsson et al., (1993) claim this approach to practicing is unique in its characteristics from any other forms of training and long term engagement within this activity is critical if expert performance levels are to be achieved. In response to both an evolving societal interest in professional sports performance and how the theory of deliberate practice in relation to developing musical excellence has been well received within the mainstream psychology literature (Jenkins, 2010), considerable research has been undertaken over the past two decades to establish if elite athletes, like musicians, may also benefit from long term deliberate practice in their attempts to achieve expert status.

The first studies which examined the applicability of deliberate practice in developing sporting excellence were undertaken during the mid to late 1990`s by Hodges and Starkes (1996), Helsen, Starkes, and Hodges (1998) and Hodge and Deakin (1998). These studies supported the claims of Ericsson and colleagues as a monotonic relationship between accumulated hours of deliberate practice and performance was reported in figure skating (Starkes et al., 1996), soccer and field hockey (Helsen et al., 1998) and karate (Hodge & Deakin, 1998). More recent support for the role of

deliberate practice in developing sporting excellence has been reported in chess (Charness, Tuffiash, Krampe, Reingold, & Vasyukova, 2005), soccer (Helson, Hodges, Van Winckel, & Starkes, 2000; Ward, Hodges, Williams, & Starkes, 2007), rhythmic dancing (Law, Côté, & Ericsson, 2007), middle distance running (Young & Salmela, 2002) and triathlon (Hodges, Kerr, Starkes, Weir, & Nananidou, 2004). Collectively, this research which retrospectively examined both the accumulated hours of deliberate practice undertaken in addition to levels of enjoyment, relevance, physical effort and concentration experienced by elite sports performers revealed how expert sports performers tended to start participating in deliberate practice activities from an early age and undertook thousands more hours of deliberate practice (generally 10,000 hours or more) in comparison to intermediate and recreational level participants.

The initial sport specific deliberate practice research was also responsible in the evolution of deliberate practice theory. Firstly, deliberate practice theory emerged from research within the music and chess disciplines which are activities that don't require the performer to undertake physically demanding movements that require large muscle groups. However, the research by Hodges and Starkes (1996) which sought to test the applicability of deliberate practice theory in relation to acquiring expert wrestlers and figure skaters was influential in refining the definition of deliberate practice within a sporting context because it required participants of different standards to provide insights into the intensities of both concentration (mental effort) and effort (physical effort) exerted throughout their developments instead of providing a unique rating for effort.

The second major development in the theory was the examination of sporting excellence within team sports including football and field hockey and this shift in focus allowed for

greater insights into the training regimes of elite team sports performers to be characterised (Helsen et al., 1998; Van Rossum, 2000, Baker, Côté, & Abernethy, 2003). For example, Helsen and colleagues examined the individual practice, team practice, sport-related activities and everyday life activities undertaken by international, national and provincial soccer players. Each segment of overall training was rated by participants on the dimensions of relevance to improving soccer performance, enjoyment, concentration and physical effort. Similarly, Van Rossum used the same procedures to examine the practice histories of Dutch national male field hockey teams at the under 18 and 21 age categories.

1.7 Objectives of the Thesis and Contribution to Body of Knowledge

Although many studies located within the existing sports expertise literature have examined the participation and training patterns of elite level performers through the lens of deliberate practice theory, the framework has yet to be applied to golf. These existing studies have also tended to use multi-method quantitative (e.g. Hodges & Starkes, 1996; Baker et al., 2005) or qualitative (e.g., Côté, 1999; Johnson et al., 2008) methodologies which may restrict the potential to explore the development of elite sports performance. Consequently, this thesis employed a mixed methods approach as it was considered a more suitable approach for capturing and exploring the on-going multi-faceted developments of expert and non-expert adolescent golfers. Experts are generally defined within the extant literature as those who compete at international and/or national levels (e.g., Helsen et al., 1998). In this thesis, adolescent experts were defined as national level adolescent golfers who were current members of representative teams sanctioned by the English Golf Union (EGU). Non-expert adolescents were defined as county level adolescent golfers who were all full time AASE (advanced apprenticeship in sporting excellence) students at an academic institution based in the

north of England. (Henceforth, expert and non-expert will be referred to as elite and aspiring elite respectively).

This PhD project intended to fill a void in the literature by undertaking a combination of longitudinal, retrospective and experimental studies which examined the applicability of deliberate practice theory within the development of elite adolescent golf performance. It is anticipated that the findings will provide a timely and appropriate contribution to the limited golf development literature that currently exists and may offer practitioners and policy makers who work within golf talent development systems with stronger evidence to nurture exceptional golf performance in the future. Finally, it is hoped this PhD project will open new horizons for further research into the role that deliberate practice may play in developing adolescent golfing excellence.

The main objectives of this thesis were to:

1. Identify the types of golf activities undertaken by aspiring elite adolescent golfers over a nine month period and compare actual and recalled data.
2. Examine the developments and lived experiences of elite adolescent golfers.
3. Implement a deliberate practice intervention to aspiring elite adolescent golfers.
4. Determine the effects of a deliberate practice intervention upon performance and practice behaviour of aspiring elite adolescent golfers.

1.8 Overview of Work

Chapter two opens with an overview of the nature-nurture impasse and historical developments of mainstream expertise research across a range of disciplines. The next section develops the rationale for the thesis by critically evaluating the existing sport expertise literature with specific reference to the theories of deliberate practice

(Ericsson et al., 1993) and deliberate play (Côté, 1999). The chapter concludes by determining the impact that environmental, psycho-behavioural, social, and contextual moderators may inflict upon the development of sporting excellence. The findings of four studies are then reported.

The primary objective of chapter three were to examine the types and intensities of golf activities undertaken on a day to day basis by aspiring elite adolescent golfers over a nine month period through self-report diary logs. The second objective of this study was to compare the accuracy of diary and recalled data once the study was terminated. Chapter four used a modified version of the interview framework prescribed by Côté, Ericsson and Law (2005) to guide conversations and obtain insights into key milestones and participation and practice histories encountered by elite adolescent golfers. Chapter five employed Interpretive Phenomenological Analysis (IPA) to focus on capturing and exploring the meanings that elite adolescent golfers assigned to their own lived experiences throughout their golf careers to date**.** Chapter six examined the effectiveness of a 13 week golf specific deliberate practice intervention upon putting performance of aspiring elite adolescent golfers who had no previous experience of structured golf specific practice regimes. Social validation and five month follow up interviews were also undertaken to provide further insights into the participants experiences of the intervention and the effect it had upon their long term approach to practicing. In chapter seven, the major findings to emerge from the four studies are discussed in accordance with the theoretical framework of deliberate practice theory and evaluated in relation to their potential impact for future talent development in golf initiatives. The chapter concludes by presenting implications for players, practitioners and policy makers, identifying limitations and addressing future avenues for research.

CHAPTER 2

HISTORICAL OVERVIEW OF EXPERTISE RESEARCH

2.1 Introduction

One of the oldest and most persistent debates in the behavioural sciences is the relative importance of genetic endowment and environmental experience in the development of exceptional abilities (Baker & Horton, 2004; Bouchard & Malina, 1983; Kimble, 1993; Phillips, Davids, Renshaw, & Portus, 2010a; Pinker, 2002; Simonton, 1999, 2001; Winner, 2000). The nature versus nurture impasse has long raged and has generated lively discussion between talent development researchers for many years (Baker, 2012; Bloom, 1985; Bouchard, Malina, & Perusse, 1997, Ericsson & Charness, 1994; Ericsson & Williams, 2007; Hemery, 1986; Howe et al., 1998, Manning & Taylor, 2001; Rankinen, Perusse, Rauramaa, Rivera, Wolfarth & Bouchard, 2001, 2002; Singer & Janelle, 1999; Williams & Hodges, 2004).

2.1.1 Sir Francis Galton

Over 140 years ago, Sir Francis Galton (1869) cited in Ericsson (2006a) alleged that levels of human performance were restricted by innate biological capacities. Galton (1874) cited in Ericsson (2006a) labelled the debate surrounding the relative importance of genetic endowment and environmental experiences as the nature-nurture issue. His research which examined the developments of eminent individuals from Great Britain during the 19th century found their genetic roots were traceable to a select number of families. Descendants from these families were also found to have made significant societal contributions across countless fields such as politics, science, law, music, art and literature. These findings led Galton to claim how heritable potential which

allowed specific individuals to attain outstanding levels of performance within a diverse range of skill domains existed (Ericsson et al., 1993; Ericsson, 2006a). As a result of Galton's research, the attributed importance of innate factors towards attaining excellence appeared compelling and had considerable impact upon cultural views concerning the development of expertise at the time (Ericsson, 2006b; Summers, 2004). Throughout the 20th century, Galton's work informed the development of numerous psychometric tests which became a popular screening tool for selecting "talented" individuals on the basis of their memory and intelligence capabilities into professional schools and academies for sports and arts (Ericsson, 2006b).

2.1.2 Bryan and Harter

Bryan and Harter's research at the beginning of the 20th century which examined the sending and receiving of morse code is regarded as a pioneering study in motor learning research (Schmidt & Lee, 2005; Summers, 2004). This study examined the mechanisms affiliated with sending and receiving messages via morse code and revealed how telegrapher's performances on receiving messages which were indexed by the number of letters per minute improved substantially during the first 20 weeks of practice. During the subsequent six weeks, performance remained constant before slight improvements were again observed. This finding led the authors to believe how the period of non-improvement occurred because lower-order habits such as learning the letters were approaching their maximum development but not yet sufficiently automated to leave attention free to process the 'higher order' habits such as combinations of words and sentences. The duration of the plateau was thought to be associated to the difficulty experienced in making lower-order habits automatic and effortless. Overall, this study revealed that experienced operators displayed greater accuracy and consistency in their

coding over experienced operators and an acquisition period of at least ten years of experience was essential to become a professional telegrapher (Ericsson, 2006b).

2.1.3 Simon and Chase

Historically, sport specific expertise research received limited attention from psychologists and its origins lay in the work of De Groot (1965) who undertook an influential study which investigated the development of expert chess performance. This research which required chess masters and skilled club players to "think aloud" whilst selecting the best move for chess position revealed how chess masters recognised and generated superior chess moves in comparison to skilled club players through their reliance upon acquired experience and planning (Ericsson, 2006a). In subsequent chess related research, investigators utilised similar methodological approaches to those undertaken by De Groot to scrutinize advanced levels of thinking by established experts across various domains. For example, the requirement of undertaking of a prolonged acquisition period (e.g., 10,000 hours) prior to attaining expertise was initially provided by the influential research undertaken by Simon and Chase (1973) who examined the cognitive-perceptual processes associated with acquiring international grand master chess status. This study established how grand master chess players possessed over 50,000 memories which enabled them to retrieve appropriate moves required for success within international tournaments. Taken at face value, this study revealed how no less than ten years of structured chess specific practice was required in all instances to accrue the cognitive skills required to perform at the world class level of chess performance.

2.1.4 The Theory of Deliberate Practice

In the early 1990`s, a framework for developing excellence was forwarded by Ericsson and colleagues based on their research which examined if volumes and types of domain related activities undertaken by elite and non-elite musicians at the Berlin Music Academy were accountable for individual differences in musical performance. Specifically, the training and developmental histories of highly accomplished and aspiring elite musicians were obtained through retrospective questionnaires and weekly diary logs. The findings of the study revealed a monotonic relationship between levels of activity characterised as deliberate practice and performance levels. All expert violinists were found to have spent similar amounts of time (over 50 hours per week) engaged within musically related activities and undertook more deliberate practice activities compared to non-elite musicians per week. Expert violinist`s undertook over 10,000 hours of deliberate practice activities by the age of 20, which on average was roughly 2,500 and 5,000 hours more than two less accomplished groups of violinists based at the same academy. In comparison to amateur pianists of similar age, international standard pianists had undertaken 6,000 more hours of deliberate practice.

The origins of deliberate practice theory are grounded in the research undertaken by Simon and Chase (1973) which identified domain specific information processing characteristics that differentiated elite and non-elite chess players. Deliberate practice is characterised by training parameters and activities that are engaged in specifically to improve performance rather than enjoyment and require sustained physical effort and concentration (Ericsson et al., 1993). Deliberate practice is distinct from other styles of practice as it should not only involve the repetition of instructed behaviours but also involves problem solving and the development of planning, evaluating and monitoring (Ericsson et al., 2007a). The theoretical framework of deliberate practice theory implies

any healthy individual whose development includes approximately 10,000 hours of deliberate practice over a ten year period in any given field can attain expert status. Opposing the influence of innate talents, the theory claims expert status is attained incrementally as a natural consequence of long term exposure to highly specialised, relevant and effortful deliberate practice schedules.

In agreement with Ericsson and colleagues who claim 10,000 hours of deliberate practice must be amassed to achieve expert status in any discipline, the findings of Howe and colleagues who examined the development of outstanding musicians provided a compelling argument against the concept of innate talent in developing expertise (1998, 1999). In congruence with Ericsson et al., (1993), they argued that musical excellence was not the result of innate talents per se, but differences in training regimens, motivational orientations, levels of self-efficacy and long standing desires of achieving ultimate success within their particular area. Howe (1999, p.17) also claimed individuals who achieved excellence status were "exceptional in their single mindedness, strength of their commitment and determination, dedication, and the abilities to persevere in the face of difficulties and to concentrate on reaching their goals whilst resisting distractions."

The decision by Howe et al., (1998) to oppose the concept of inborn talent did attract criticism from fellow talent development researchers who expressed reservations over the accuracy of the theoretical frameworks they based their claims upon. For example, Csikszentmihalyi (1998) disagreed with the exclusivity of the work and argued the development of talent involves both personal qualities based on innate constructs and social opportunities, support and rewards. Likewise, Detterman, Gabriel, and Ruthsatz (1998) and Gagne (1998) argued how literature which reveals how general intelligence

is positively related to musical ability and academic excellence was not discussed and they also questioned the accuracy of the retrospective evidence presented to support their argument for practice over talent.

The research undertaken by Ericsson and colleagues over the past 20 years which showcases the effectiveness of deliberate practice in developing expert performance across a wide range of disciplines provides theoretical support for the assumption that world class performers are made and not born and individuals located at the top of the talented achievement scale are not inherently different from those lower down. The theory also implies how it is not simply training of any type, but engagement in long term, physically and mentally demanding activities that is necessary for continued improvements in motor learning and performance. The study by Ericsson et al., (1993) was also unique as it explored if the volumes, intensities and types of domain related activities undertaken by elite and non-elite musicians explained for individual differences in musical performance. Amounts of time spent undertaking deliberate practice were directly related to performance accomplishments which suggested how the amount of deliberate practice an individual engaged within throughout their careers was a primary determinant of world class musical performance.

Since the seminal study by Ericsson and colleagues, a growing body of literature has revealed how expertise is attained incrementally as a natural consequence of long term exposure with highly specialised, individualized, conscious, effortful deliberate practice which is tailored towards improving current performance levels (Ericsson et al., 1993; Ericsson, 1996; Ericsson & Lehmann, 1996). It is important to emphasise how deliberate practice activities differ from all other forms of practice as they do not involve only the repetition of instructed behaviours, but also problem solving and the

development of internal representations for planning, evaluating and monitoring mental representations (Ericsson et al., 2007a). Therefore, deliberate practice activities are considered to have occurred when a well-defined task (e.g., aiming to improve golf putting performance) with an appropriate difficulty level for the participant is completed with access to informative feedback, and opportunities for repetition and corrections of errors (Farrow, 2012).

2.1.5 The Role of Nature in Developing Excellence

Academics located both within and outside of the sporting domain has challenged this environmentalist approach to developing excellence by claiming the acquisition of exceptional sporting abilities are best explained genetically (e.g., Anderson, Schjerling, & Satlin, 2000; Baron-Cohen, 1998; Bouchard, Malina, & Perusse, 1997; Entine, 2000; Feldman & Katzir, 1998; Freeman, 1998; Manning & Taylor, 2001; Plomin, DeFries, McClearn, & Rutter, 1997; Rice et al., 2002; Taubus, 2000). A key finding of these studies is the suggestion how world class status in any discipline is dependent upon a multitude of variables including innate ability, initial interest, excellent instruction and appropriate practice regimes. Support for this holistic approach to acquiring excellence which claims expert status is acquired as a result of interactions between genetic and environmental factors rather than one factor in isolation (e.g., deliberate practice regimes) is provided within the literature (see Gobet & Campitelli, 2007 for an overview).

Empirically distinguishing cause and effect in nature nurture research is complex and only identical twin studies may answer the many questions faced by talent developers as they provide an exceptional resource for exploring the interaction of genetic and environmental factors (Joseph, 2003; Boomsma, Busjahn, & Peltonen, 2002). The

outputs of research which has utilised monozygotic twins has allowed researchers to quantify the extent to which these factors may influence variation between developments (see klissouras, Geladas, & koskolou, 2007 for an overview). Collectively, this research suggests the only significant contributory factor towards expert performance in sport once environmental forces are optimized is the genotype. However, despite their popularity in mainstream psychological and physiological research which has examined topics including health and susceptibility to disease (e.g., Maes, et al., 1996), twin research in sport and exercise psychology is limited.

One of the few sport specific studies to use twins was undertaken by Klissouras et al., (2001) which examined the developments of twin Olympic athletes who had lived together since birth and competed in the 20 kilometre race walking discipline. Whilst genetically identical and exposed to comparable environmental influences including the same training regimes and coach, noticeably different levels in performance were observed throughout their careers. Both twins had trained specifically for the ten kilometre competitive walking event aged between 15 and 18 but changed disciplines between 19 and 33 when they both undertook the same training programme for the 20 kilometre event. One twin went on to become an Olympic medal winner at three successive Olympic Games as well as world champion in 1987, whilst the other secured 11th place at the 1980 Olympics and was world champion in 1983 when his brother did not participate.

Interestingly, personality assessments revealed how the twins displayed similar levels of anger towards others throughout their careers although the Olympic champion had an overstated response to frustration and showed extreme sensitivity to disapproval and pessimistic evaluations when compared with his twin. Alternatively, the emotional

reactions of his brother were very different as he was insensitive to criticism and more able to control anger. Although this study comprised low participant numbers, was highly reliant on retrospective recall and failed to confirm the intensities, durations and types of training undertaken throughout the athletes careers, it does reveal how the performance achievements and personality characteristics of genetically identical and identically trained twins were noticeably different throughout their careers.

2.2 An Examination of Talent Development Pathways in Sport

Talent development has become big business with the organisers and administrators of worldwide sports programmes in recent years (Abbott & Collins, 2004; Bullock,et al., 2009; Halson, Martin, Gardner, Fallon, & Gulbin, 2006; Regnier, Salmela, & Russell, 1993; Vaeyens, Gullich, Warr, & Philippaerts, 2009). The citation path analysis undertaken by Bruner, Ericsson, McFadden, and Côté in (2009) revealed the work of Bloom (1985), Ericsson et al., (1993) and Côté (1999) which illustrated significant stages and transitions that were encountered by individuals throughout their development to expert status in music, sports and the arts have had a substantial influence upon the direction of talent development research and the conceptualisation of talent models in sport over the past 25 years. The theories of deliberate practice and deliberate play forwarded by Ericsson et al., (1993) and Côté (1999) respectively have received the greatest research attention and have been integrated within the most recent models of developing excellence to emerge from the talent development literature (e.g., Morgan & Giacobbi, 2006; Wylleman, Alfermann, & Lavallee, 2004).

Both deliberate practice and deliberate play theories emphasise how the types, durations and intensities of training undertaken during specific stages of a sport performers development have important implications for achieving both expert status and retaining

long term involvement in sport and physical activity (Côté, Horton, MacDonald, & Wikes, 2009; Côté, Lidor, & Hackfort, 2009). Traditionally, sport specific talent development programmes have adopted a short term vision to developing expertise and have been overly concerned with acquiring immediate success through exposing children from a young age with large amounts of deliberate practice on an annual basis (Fraser-Thomas, Côté, & Deakin, 2008a, 2008b, MacNamara & Collins, 2011; 2012). This early specialisation approach to development has been successful in developing expert rhythmic gymnasts (Law et al., 2007) and figure skaters (Hodges & Starkes, 1996) where peak performance is generally achieved prior to sexual maturity. This pathway however does require considerable levels of investment and commitment from a young age and discourages the sampling of other sports and activities during childhood and adolescence as opposed to deliberate play theory which seeks to develop motor learning and maintain participation within a healthy developmental environment that encourages a diversified sporting experience (Bruner et al., 2009; De Knop, Engstrom, & Skirstad, 1996; Gould & Carson, 2004; Hecimovich, 2004; Hill, 1988; Hill & Hansen, 1988).

A comprehensive amount of research undertaken over the past two decades which has examined the training histories and participation trends of elite and non-elite sports performers has enabled researchers to gain further understanding about the mechanisms that underpin the acquisition of elite performance. Expertise refers to the mechanisms underlying the superior achievement of an expert (Ericsson, 2007a) and is generically defined as "one who has acquired special skill in or knowledge of a particular subject/s through professional training and practical experience" (Webster's Dictionary, 1976, p. 800). Throughout this chapter, a distinction between learning activities which may be described as practice and those that may be described as play will be emphasised.

Ericsson et al., (1993) describe deliberate practice as a highly structured activity that requires effort, is not inherently enjoyable, and generates no immediate rewards and generates cost due to accessing teachers and training environments. Côté et al., (2007, p.184) stated how "practice is uniformly regarded in the motor learning literature as the variable having the greatest singular influence on skill acquisition, yet there remains a host of unsatisfactorily answered questions as to how much and what type of practice is necessary and is best for the development of expertise." They also described practice as an organised activity in which the principle aim is focussed towards developing skill and performance levels. The term play defines activities undertaken principally for intrinsic enjoyment but may nevertheless ultimately contribute in part towards the acquisition of excellence (Côté & Fraser-Thomas, 2007).

2.2.1 Critical Review of Sports Specific Deliberate Practice Research

Developing exceptional abilities is time intensive and individuals may encounter hardship and failure throughout their development (Ericsson et al., 2007a) and although performance improvements with deliberate practice occur gradually (Ericsson, 1996; 1998), the 10,000 hour rule is robust within music (Ericsson et al., 1993), medicine (Ericsson, 2004) and academia (Plant, Ericsson, Hill, & Asberg, 2005; Simonton, 1999). A collective finding from these studies was how elite status was only achievable if participants experienced at least ten years or 10,000 hours of deliberate practice. Examples of world class developments which reveal how individuals amassed approximately 10,000 hours of deliberate practice prior to achieving international levels in music composition (Ericsson, 1993), chess (Simon & Chase, 1973), science (Zuckerman, 1996) and sport (Hodges & Starkes, 1996) are located in the literature. To illustrate, Bobby Fisher achieved senior level international status in chess aged 15 after starting an intensive training programme during early childhood aged six and the initial

works of internationally recognised scientists are normally published aged 25 with their most notable publications occurring roughly ten years later (Ericsson et al., 2006).

Encouraged by the finding how expert musicians undertook approximately 10,000 hours of deliberate practice (Ericsson et al., 1993), Hodges and Starkes (1996) undertook the first research study which sought to determine the applicability of deliberate practice theory within a sporting context. This study involved four groups of male amateur wrestlers (two international level and two club level with one current and one retired) completing a questionnaire which required participants to recall the amounts of hours they spent in various activities and the relevance, physical effort, concentration and enjoyment assigned to each activity since they began their wrestling careers. A unique feature of this study was how the researchers modified the dimensions of their questionnaire slightly from that of Ericsson et al., (1993) to allow participants to provide ratings for both the amounts of concentration and physical effort exerted throughout their developments instead of providing a unique dimensional rating for effort alone. The first section of the questionnaire obtained biographical information relating to the number of sports undertaken and key milestones including when practice was first started. The first part of the questionnaire required participants to provide estimations for a typical week regarding the amounts of time they had spent practicing for wrestling individually, in team practice activities, in wrestling related activities and everyday activities at three year intervals. The second part of the questionnaire required participants to rate each of the activities on four dimensions (from zero to ten where zero was very low and ten was very high) termed relevance to improving wrestling performance, effort required to perform the activity, enjoyment derived from the actual activity and concentration required to perform the activity.

Data obtained from part one of the questionnaire, which was examined as a function of age and years engaged within wrestling, revealed all groups had over ten years wrestling experience. All participants began wrestling (aged 13 years), undertook systematic coaching with a coach (aged 14 years) and annual practice regimes (aged 16 years) at similar ages and reached the peak of their careers in their mid-twenties after approximately 12 years exposure with the discipline. Participants also started wrestling specific practice activities at a later age (between 13 & 14 years old) in comparison to the musicians in Ericsson`s study (approximately eight years old) and differences in the amount of time that international-level wrestlers (M = 38.7 hours per week) estimated spending in practice compared to club level wrestlers (M = 20.9 hours per week) started to emerge only after approximately six years involvement in wrestling. Although international wrestlers encountered greater amounts of practice (M = 5882) compared to club wrestlers (M = 3571), total practice hours required to achieve elite wrestling status was lower than the 10,000 hour rule advocated by Ericsson et al., (1993).

Part two of the questionnaire revealed how within the practice with others activities, matt work received significantly higher ratings for all four dimensions and running received a significantly higher effort rating. In the practice alone activities, weight and running received significantly higher ratings for relevance and effort. Working with a coach alone received a significantly higher rating for relevance only. Mental rehearsal within the wrestling related activities received significantly higher ratings for both relevance and concentration. Both active and non-active leisure related activities received significantly lower ratings for concentration an effort and sleep significantly higher ratings for relevance and enjoyment. In summary and opposing Ericsson et al., (1993), the key finding from this study was how practice alone activities did not differentiate between the groups whereas practice with others did.

On the other hand, additional research by Hodges and Starkes (1996) which examined the developments of figure skaters revealed how they began participating in this activity much earlier than the wrestlers at the age of roughly five years old. They also undertook private lessons from roughly seven years of age, followed an annual skating specific training regime from approximately the age of ten and were performing at an international level by roughly the age of 21. The mean number of hours per week spent practicing alone by national and junior national team members was similar to the figures reported by Ericsson et al. for the best and good violinists (M = 21.2 hours). Examination of ratings for practice with others, practice alone, figure skating related and everyday activities revealed significant ratings for relevance, effort, concentration and enjoyment were provided for both on ice activities and lessons with a coach.

Helsen et al., (1998) extended the work of Hodges and Starkes (1996) through the examination of practice trends encountered by international, national and regional level soccer and field hockey players. In relation to soccer, participants initially started to participate aged approximately five years old and encountered regular systematic practice by the age of seven. The international and national participants reached their peak after 15 years participation in soccer and spent on average 13.3 and 9.9 hours per week respectively undertaking a combination of individual and team specific practice activities in comparison to 6.9 hours for the regional participants. Although international participants undertook more weekly individual practice than regional participants between the sixth and 12th years of participation, they reduced the amount of individual practice to a point where no differences between skill groups in the three years after were observable. International group participants could be differentiated from the national and regional level players in both weekly team practice and accumulated practice amounts (individual and team practice combined) during years

ten, eleven and twelve of their careers which suggests that deliberate team practice instead of conventional deliberate practice as defined by Ericsson et al., (1993) may be more applicable in team based disciplines. After 18 years of participation within soccer, the international, national and regional players had accumulated a mean total of 9332, 7449 and 5079 practice hours respectively.

Evaluations of soccer specific and everyday activities revealed significant individual practice ratings for relevance were obtained for individual training with the coach and running although no activities were rated as significantly more effortful. Running also achieved a significantly higher relevance rating within team practice. No soccer related activities were rated to be highly relevant to improving performance or require a high amount of effort to undertake. Coaching soccer was the only activity to achieve a significantly high rating for concentration when compared to the grand mean. Four activities within the everyday life category received significantly higher ratings for enjoyment and only sleep received a significantly higher rating for relevance.

Further team sport research was undertaken by Helsen et al., (1998) who examined the practice trends of international, national and regional field hockey players. Replicating the findings of their research into soccer and Ericsson et al., (1993), participants started to undertake regular hockey specific practice from a young age during childhood (M = 8.9 years). After 12 years participation in hockey, both international (M = 8.2 hours per week) and national (M = 7.9 hours per week) level participants had encountered more team practice than regional level participants (M = 3.7 hours per week). Significant differences in amounts of accumulated practice were not identifiable until after 16 years of participation within hockey where regional level players accrued on average 5341 hours per year compared to the international players who accrued 8541 on average.

Achieving expert hockey status was also revealed as being very time intensive as international selection only occurred after approximately 18 to 20 years exposure with hockey specific training. Evaluations of hockey specific and everyday activities revealed how technical skills, training alone and training alone with a coach all achieved significantly higher ratings for relevance. Weight training and running were also rated significantly higher for effort and technical skills and training with a coach obtained significantly higher ratings for concentration. Significantly higher enjoyment ratings were provided for undertaking technical skills whilst flexibility training and weights were rated significantly low for enjoyment. Five of the eight team practice activities were exposed as significantly relevant to improving field hockey performance. Both running and individual practice obtained significantly higher ratings for effort but lower for enjoyment and concentration. Game analysis was the only field hockey related activity to achieve significantly higher ratings for both relevance and enjoyment. Watching field hockey was revealed as a significantly enjoyable activity to undertake and game analysis leading training sessions and coaching all received significantly higher ratings for concentration.

Hodge and Deakin (1998) employed a questionnaire similar to that used by Starkes et al., (1996) to examine the role of deliberate practice in developing exceptional karate performance. Data revealing the activities considered most relevant to performance in addition to the practice histories of expert (first degree black belts) and novice (green and orange belts) martial artists with a mean age of 18.4 and 17.4 years were obtained retrospectively. Data revealed how expert (M = 35.3 hours) and novice (M = 27.6 hours) martial artists spent similar amounts of time undertaking karate related activities at the start of their careers which are similar to the findings of Ericsson et al., (1993) and Hodges and Starkes (1996). Analysis of ratings provided on the dimensions of

relevance, physical effort, concentration and enjoyment did not reveal any activities that conformed to the original definition of deliberate practice. Evaluations of activities situated within the practicing with others group revealed significantly higher ratings for sparring, group classes, kata training and impact training on all four dimensions and ratings of concentration and effort for flexibility training. Within the practice alone activities, kata training received significantly higher ratings on all four dimensions. Flexibility training received significantly higher ratings for effort and relevance. No activity within the activities related to karate received a significantly higher rating on any of the four dimensions. Within the everyday activities unrelated to karate, sleep and active leisure both received significantly higher ratings. Overall, the findings of this study were aligned with previous research that had investigated the amounts of deliberate practice undertaken each week throughout a sport performer's development. The research by Van Rossurn (2000) also used retrospective recall to gauge the number of hours per week spent undertaking field hockey activities by male and female, youth, national and international players aged between six and 25 years. The findings revealed how elite youth players spend 4.1 (under 15) and 4.9 (under 16) hours per week practicing, whereas national players (under18) and national league club champions (18 years and older) reported spending 7.6 and 10.1 hours per week.

The studies by Helsen et al., (1998), Hodges and Starkes (1996), Starkes et al., (1996) and Van Rossum (2000) which were the first to determine the applicability of deliberate practice theory within the development of sporting excellence in both individual (ice skating, wrestling & karate) and team sports (soccer & field hockey) revealed a monotonic relationship between accumulated hours of deliberate practice and performance levels. Mean hours spent undertaking practice each week by individuals in wrestling, figure skating, soccer, field hockey and karate were comparable with those

reported by the musicians in Ericsson et al., (1993). Whilst these findings conformed with the majority of the tenets which underpin deliberate practice theory such as all participants started a specialised programme of practicing in their primary sport from an early age and accrued at least ten years' experience prior to achieving expert status, they did encounter some issues with the application of the theory within the sporting domain. For example, although Ericsson et al., (1993) stipulated that practicing alone was the only activity which fulfilled the requirements of deliberate practice, these studies revealed how the amount of time spent in practice with other athletes (e.g., team based deliberate practice) was equally as important as solitary practice and how activities that are rated as high in relevance, physical effort and concentration may also be enjoyable for individuals to undertake.

Research undertaken more recently has also provided support for the theory of deliberate practice as a suitable framework for the acquisition of senior level sporting excellence. For example, the findings of Ward, Hodges, Williams, and Starkes, (2007) who undertook a cross sectional research design using retrospective questionnaire to examine participation histories of nine aged matched groups of elite and recreational level English youth soccer players provides support for the of deliberate practice theory in developing adolescent level soccer excellence. The study revealed how elite level youth soccer players between the ages of six and 12 did not encounter greater volumes of playful activities and alternative sports nor specialise later when compared with non-elite soccer players. Non-elite players undertook greater volumes of playful activity than elite players whilst elite players undertook greater volumes of soccer specific deliberate practice than the non-elite players. Elite players also perceived themselves to be more competent at soccer than non-elite players. Whilst this study was reliant on retrospective recall, lacked triangulation of data and focused only on daily

developments encountered by expert youth instead of expert senior level competitors between the ages of six and 12, it does suggest how greater exposure with soccer specific deliberate practice activities from an early age may act as an effective strategy for on-going improvements in motor development and performance.

Using a quantitative questionnaire, the aim of Ford, Ward, Hodges, and Williams (2009) was to examine domain specific activities experienced by three groups (received full time scholarship, were released aged 16 and only ever competed at a recreational standard) of soccer players between the ages of six and 12. Findings revealed no significant differences between the amounts of sports played and mean hours of engagement in other sports between the ages of six and 12 years in young footballers who either received a full time professional scholarship aged 16, those who were released and a sample who had only ever competed recreationally. Scholars also undertook larger volumes of football specific deliberate practice throughout their careers compared to peers who were released from professional clubs aged 16 and recreational athletes. Although the findings support the role of deliberate practice theory in developing adolescent soccer excellence, weaknesses of the study comprised the small sample size, failure to verify the findings with coaches, parents or historical records and the retrospective nature of data collection which only focussed on the participants sporting involvement and participation between ages six and 12 must be considered.

Further support for deliberate practice theory as a mechanism for developing sporting excellence was provided by Ford and Williams (2008) who examined the influence that participation within Gaelic football had upon the development of Irish professional soccer players. The aim of this study was to determine if early diversification in Gaelic

football during childhood aided the development of expert performance in soccer in later life. The sample comprised 20 male professional soccer players with experience of playing in the Irish Premier League and retrospective quantitative questionnaires were used to trace the developmental activities of both sample groups. Ten of the participants had no Gaelic soccer experience whereas the other ten had competed in Gaelic football at regional level during their adolescence. The findings of the study found no significant findings between accumulated hours of soccer specific practice undertaken by professional soccer players who participated in Gaelic football and those who did not throughout their development.

Athletes who compete within sports where peak performance is required at an early age have also benefited from early specialisation pathways that incorporate deliberate practice from a young age. For example, Law et al., (2007) examined the participation histories of both Canadian Olympic and lesser skilled international standard rhythmic gymnasts. Throughout their careers, Olympic gymnasts undertook no more than one other alternative sports between six and 12 years of age, whereas all lower skilled international gymnasts participated in three or more other sports. Olympic gymnasts also accumulated three times the amount of gymnastic specific deliberate in comparison with international gymnasts by the age of 16. Whilst the merits of deliberate practice for developing elite rhythmic gymnasts are presented in this study, the negative psycho-social consequences that were reported by the Olympic gymnasts which included reduced enjoyment, poorer physical health and higher amounts of injuries when compared with international gymnasts must also be considered.

Qualitative interviews were undertaken by Johnson, Castillo, Sacks, Cavazos, Edmonds and Tenenbaum (2008) to gain insight into the nature of training required to achieve

world class levels of swimming performance. The sample comprised six American swimming coaches who were currently or had previously coached elite (Olympic gold or current/ex world record holders) and sub elite (American national championship competitors or regional standard) swimmers were participants. The results of the study imply that elite swimmers encountered opposing developmental histories that comprised both a mixture of early specialisation and diversification pathways throughout their journey to elite status. The findings of this study emphasise how coaches must consider how a specific training programme that aids one athlete's achievement of elite performance may not be efficacious for another. Drawbacks of the study which included the homogenous nature of the sample coupled with the failure to triangulate data with insights from swimmers, parents and historical records may have influenced the accuracy of the findings obtained.

The study by Weissensteiner, Abernethy, Farrow and Muller (2008) utilised a mixed methods approach to determine the applicability of deliberate practice theory in the development of elite cricket performance. In total, 102 male cricketers (batsmen only) from six different skill and age groupings (skilled under 15, 20 & over 20 and unskilled under 15, 20 & over 20) completed a laboratory based batting task to measure anticipatory skill in cricket and retrospective interviews which examined participants practice and development histories. Results from the laboratory tests revealed how skilled over 20 and under 20 players possessed a superior ability to anticipate ball type and length. Interviews indicated that skilled players of all ages were distinguishable in terms of the accumulated hours of cricket specific deliberate practice they had undertaken when compared to non-skilled players. A criticism of this study however was the failure to differentiate the micro structure of cricket specific practice undertaken

by the elite and non-elite performers which was a recommendation for future expertise research proposed by Williams and Ericsson (2008).

The findings from other sport specific deliberate practice research undertaken within chess (Charness, Tuffiash, Krampe, Reingold, & Vasyukova, 2005) middle distance running (Young & Salmela, 2002) and triathlon (Hodges, Kerr, Starkes, Weir, & Nananidou, 2004) also solidifies the theory that exposure with at least 10,000 hours of deliberate practice is central for acquiring sporting excellence. Collectively, this section of the review has demonstrated how sustained long term deliberate practice is unquestioned in the pursuit of expert sports performance and support for 10,000 hour rule and the monotonic benefits assumption is widely acknowledged throughout the sport and mainstream expertise literatures.

Previous research examining the career development of elite golfer's is sparse. However, one of the few publications to do so was the special issue of the International Journal of Sport Science and Coaching (2010) which discussed the applicability of deliberate practice theory in golf using Ben Hogan as a case-study. The debate began with Jenkins (2010) providing a comprehensive insight into the career development of golfing legend Ben Hogan in which he was portrayed as a performer who spent many thousands of hours independently undertaking practice activities designed specifically to improve his golfing performance. In light of the evidence presented and arguments made by Jenkins, Ericsson's theoretical explanation for acquiring expert performance (e.g., undertaking 10,000 hours of deliberate practice) seems to apply well with Hogan's practice behaviours.

Wiren (2010) also presented Hogan as being a supremely disciplined, self-regulated, industrious, mentally and physically strong individual who worked tirelessly over many years to achieve his life goal of becoming a world class golfer. Again, this appears to support Ericsson's theory of deliberate practice. Furthermore, Cobley and Baker (2010) highlighted the clear similarities between the deliberate practice framework and the strategies employed by Hogan to achieve world class status. However, it has to be acknowledged that this special issue is limited by the retrospective nature and its associated problems, the reliance on second hand (none of the researchers directly spoke to Hogan) and anecdotal information and as such lack scientific rigour. Therefore, it is difficult to establish the precise kind of deliberate practice regimes (e.g., the make-up of practice activities at the micro level) or self-regulatory skills which assisted Hogan to become one of the all-time great golfers.

Whilst support for the framework of deliberate practice exists in relation to developing excellence across a series of human endeavours, a range of conceptual, developmental, methodological, and motivational issues have come to the fore (Detterman, Gabriel, & Ruthsatz 1998; Gagne, 1998; Trehub & Schellenberg, 1998; Sternberg, 1996; Ward et al., 2004). For example, Sternberg (1996) and the research undertaken by Côté and colleagues has been highly critical of the theory and questions the decision to embark on early specialisation pathways which expose participants with deliberate practice from early childhood as this may not provide an optimal environment for healthy long term development and lifelong involvement in sport and physical activity (see Côté et al., 2009 for an overview). The theory also places a narrow emphasis on the main constraints of time and effort spent practicing regardless of the individual's innate ability (Baker & Davids, 2006) and only practice activities performed in isolation meet the deliberate practice guidelines proposed by Ericsson et al., (1993) which lacks

support in the sports literature (Helsen et al., 1998; Hodges & Starkes, 1996). The theory also fails to acknowledge the influence that exposure with regular competition, observing others and engaging with un-structured athlete led activities (e.g., deliberate play) may have upon the development of expertise.

Whilst Ericsson et al., (1993) also proposed that deliberate practice should not be inherently enjoyable for an individual to undertake, a range of sport specific research undertaken with individual and team sports performers opposes this point of view (Helsen et al., 1998; Hodges & Starkes, 1996). Collectively, this research demonstrated the need to re-examine the definition of deliberate practice because time spent undertaking team and/or group practice were revealed as a highly appropriate predictor of differences between exert and non-expert performers in comparison to solitary deliberate practice activities as initially suggested by Ericsson et al., (1993). These studies also revealed how intensive practice activities such as sparring in wrestling or on-ice work in figure skating were judged the most relevant and considered to be the most enjoyable to undertake. It is also apparent from the exiting literature how the volumes of deliberate practice required to become an expert sports performer, and the age at which this form of specialised raining should commence, differs noticeably amongst successful athletes across sports (e.g., wrestling and soccer).

Another drawback of deliberate practice theory is its failure to define specifically what constitutes being categorised as either a healthy individual or not and the failure to clarify why motivated individuals who may have undertaken the recommended 10,000 hours of deliberate practice within a supportive, resource rich environment, may still fail to achieve expert status. Furthermore, age is not explicitly considered an important factor in mediating the effects of practice on performance in Ericsson et al.'s (1993)

theory of deliberate practice (Ward et al., 2004). Research has also revealed how performance levels and volumes of deliberate practice undertaken do not always correlate positively. For example, Ericsson (2004) revealed how decrements in the accuracy of professional medical diagnosis in relation to heart sounds and x-rays occurred after the completion of formal medical training. The theory also fails to account for the achievements of world class athletes such as Rebecca Romero, who after winning an Olympic silver medal in the quadruple skulls rowing event in 2004, took up track cycling in 2005 and within two and three years respectively, became world and Olympic champion in the individual pursuit discipline. Equally, after winning two bronze medals as a cyclist at the Olympic games in 2000, Clara Hughes re-orientated her sports career in 2001 and went on to win two additional medals including one gold at each of the 2002 and 2006 Winter Olympic Games in speed skating (Vaeyens et al., 2009).

Rowe (1998) also questioned the assumption that any healthy individual can become an expert performer and Freeman (1998) argued no randomly selected individual has ever reached world class status in any domain through exposure with long term practice alone. As a case example, he discussed how Australia and East Germany historically conducted national talent and screening searches for individuals with physical characteristics considered suitable to succeed in a range of sports including rowing and track and field. Those individuals who achieved the highest test scores then embarked on a long term programme of intensive training and typically went on to compete at international and occasionally world class levels of competition. Freeman bases his argument upon the fact that elite athletes were actually identified at a young age as talented sport performers and then exposed to intense training and not randomly picked from the population and encouraged to train intensively to achieve elite status. Crucially

however, the mechanisms through which Eastern European countries selected individuals upon their developmental programmes does not imply anything about the role of talent as this process does not confirm that the non-selected could not achieve elite levels of performance. Hence, there is evidence that these countries orchestrated systematic doping programmes and it may be argued that anybody who was selected to undertake such doping programmes would ultimately succeed in comparison to their non-doping competitors (www. Guardian.co.uk, 2005).

As the framework of deliberate practice theory is situated within cognitive learning mechanisms (Ericsson 2007a), it also disregards affective (e.g., enjoyment) and personal and social (e.g., interaction with others) factors associated with the development of elite performance. This has resulted in the theory, and its applicability within sport, receiving incessant criticism from psycho-social researchers ever since the initial research studies by Starkes, Hodges, Helsen and colleagues in the mid 1990`s were published. This disapproval has focused on several trade-offs considered to be associated with intensive deliberate practice protocols including dropout, overtraining, burnout and social isolation (Baker, Cobley, & Fraser-Thomas, 2009; Carlson, 1988; Gould et al., 1996a, 1996b; Gustafsson, Hassmen, Kentta, & Johansson, 2008; Wall & Côté, 2007), increased injury rates (Baxter-Jones & Helms, 1996; Dalton, 1992; Law et al., 2007), body image (Davidson, Earnest, & Birch, 2002) and eating disorders (Anshel, 2004; Baker et al., 2009) in young adolescent athletes.

The research by Gould and colleagues (1996a, 1996b) revealed burnout was particularly susceptible within individual sports such as tennis that have historically encouraged an early specialisation approach to sport development. The study found high ranking junior tennis players based in North America had tended to compete against elder

opponents throughout their childhood and teenage years and had minimal input into the design of their training schedules. Comparable findings were found by Harlick and McKenzie (2000) in their study which examined the developmental experiences of elite junior tennis players in New Zealand. Young athletes exposed to structured training and competition regimes have also displayed less sharing and helping behaviours (Barnett & Bryan, 1974) and are more susceptible to encountering social isolation and identity foreclosure as a consequence of early specialisation pathways (Gelfand & Hartmann, 1982).

The research by Fraser-Thomas et al., (2008a) examined the training histories encountered by elite early adolescent Canadian swimmers who were either still competing or had recently withdrawn from the sport. In comparison to engaged swimmers, dropout swimmers encountered a clear pattern of early specialisation and undertook less play orientated swimming activities; started undertaking land based training activities and reached "top in their club status" earlier, and took fewer periods of rest. Significantly more dropouts had parents who had been high level athletes throughout both their youth and adulthood, felt they developed a close or extended relationship with their coach at a significantly younger age and considered their peak performance to have occurred earlier compared with non-dropout swimmers. Wall and Côté (2007) also retrospectively interviewed the parents of eight current high level male adolescent ice hockey players and four who had recently withdrawn from competitive ice hockey to obtain yearly accounts about the activities experienced throughout their child's development. Both active and dropout players were found to have encountered a diverse and playful introduction to sport and invested similar amounts of time into hockey practice, games and play. In summary, the two separate groups followed similar development paths, although dropout athletes participated in more off-ice practice

activities and began this practice at a younger age in comparison to athletes who remained engaged in the sport.

To summarise, whilst the merits of deliberate practice as a strategy for acquiring sporting excellence populate the extant literature, the theory has also faced criticism from talent development researchers for the heavy focus it places upon the development of skill learning from an early age and the lack of consideration for the psycho-social context in which this learning occurs which may stifle the physical, psychological and social development of athletes.

2.2.2 Critical Review of Sports Specific Deliberate Play Research

The rule that elite status in sport is seldom achieved without early specialising and encountering no less than 10,000 hours of deliberate practice is well established. As such, early specialisation and long term deliberate practice were traditionally perceived by sport governing bodies, coaches and parents both in the United Kingdom and world-wide to be the most appropriate combination for achieving elite sports performance (Veayens, Lenoir, Williams & Philippaerts, 2008). In recent years however, the theoretical underpinnings of deliberate practice theory (and early specialisation) and the impact of physically and mentally demanding programmes from a young age in relation to developing expert sports performance have been questioned (Baker et al., 2009; Côté, et al., 2009; Jess & Collins, 2003). Supporting this stance, many studies now exist which reveal how elite sports performers from a range of disciplines have encountered diversified, fun, athlete centred, self-regulated learning environments from early childhood through to the mid teenage years as opposed to focussing exclusively upon one sport (Baker et al, 2003; Côté, 1999; Soberlack & Côté, 2003).

Opposing the argument that long term deliberate practice alone throughout childhood and early adolescence is a mandatory requirement for developing sporting excellence, the theory of deliberate play originated from the research by Côté (1999). This study was undertaken with the primary intention of extending the findings of Bloom (1985) who had undertaken a four year research project throughout the mid 1980`s which revealed insights into the developments encountered by 120 world class performers in one of six disciplines; mathematics, molecular biology, piano playing, sculpting, tennis and swimming. Parents, teachers and coaches of the participants were also interviewed and each of the six disciplines comprised roughly 20 participants. Bloom focussed his research to expose any consistency in patterns and regularities that may have emerged throughout the developmental histories of all participants as they progressed from beginner to elite level performers. The results emphasised the importance of environmental factors including long term support from parents, coaches and peers and exposure from a young age with a playful learning environment tailored to develop continued self-regulated motor learning. Once initial talent was identified by parents, participants were introduced to a qualified coach and an increasingly structured training programme reminiscent of deliberate practice was undertaken from the mid to late teenage years onwards. In summary, the longitudinal research by Bloom revealed how elite performers from wide ranging disciplines encountered three transitional periods during their careers which Côté (1999) would later develop in his pioneering research in with elite rowers and tennis performers.

Within this study, national level Canadian rowers and tennis players, plus their parents and siblings, were interviewed to gain insights into the developments they encountered on their journey to becoming elite status athletes. Although only four families participated in the study (15 participants including four athletes, four siblings, four

mothers & three fathers) and qualitative interviews were reliant on retrospective recall, the findings highlighted how participants encountered many sports from a young age through to early adolescence within a fun learning environment instead of specialising in their primary sport from a young age and undertaking long term deliberate practice. The study also emphasised how the supportive influences that parents provided, particularly during early childhood, were crucial towards the on-going development of participant motivation and performance.

Based upon the findings of Côté, (1999) and subsequent retrospective research undertaken in North America, Europe and Australia over the past decade with elite and non-elite athletes, coaches and their families from a variety of different sports including basketball, field hockey, netball, rowing, swimming, ice hockey and triathlon, (Baker et al., 2003; Baker et al., 2005; Soberlack & Côté, 2003), Côté and colleagues developed the Developmental Model of Sports Participation (DMSP). The underlying theoretical principle of deliberate play theory is to maintain regular long term involvement within fun, playful, unsupervised athlete centred learning environment throughout childhood and the early teenage years as this pathway may increase the likelihood of acquiring expert status in the long term instead of deliberate practice regimes and encourage the healthy development of physical, psychological and social attributes of an individual (see Côté & Fraser-Thomas, 2007 & Côté, & Fraser-Thomas, 2008 for an overview of both deliberate play and the DMSP).

Both Côté et al., (2003) and Williams and Ford (2008) characterised deliberate play as an intrinsically motivating form of activity which exposes participants to activities which provide immediate gratification, maximise participant enjoyment and are regulated by rules adapted from adult norms by the participants themselves (e.g., street

soccer or street basketball). To summarise, deliberate practice is characterised as highly taxing both mentally and physical to undertake with the sole intent of improving skill acquisition and performance from a young age whereas in addition to skill acquisition, deliberate play theory activities are also designed to develop empowered, motivated, life-long independent critical learners within a healthy physical, psychological and social development (Côté & Fraser-Thomas, 2007; Côté & Fraser-Thomas, 2008).

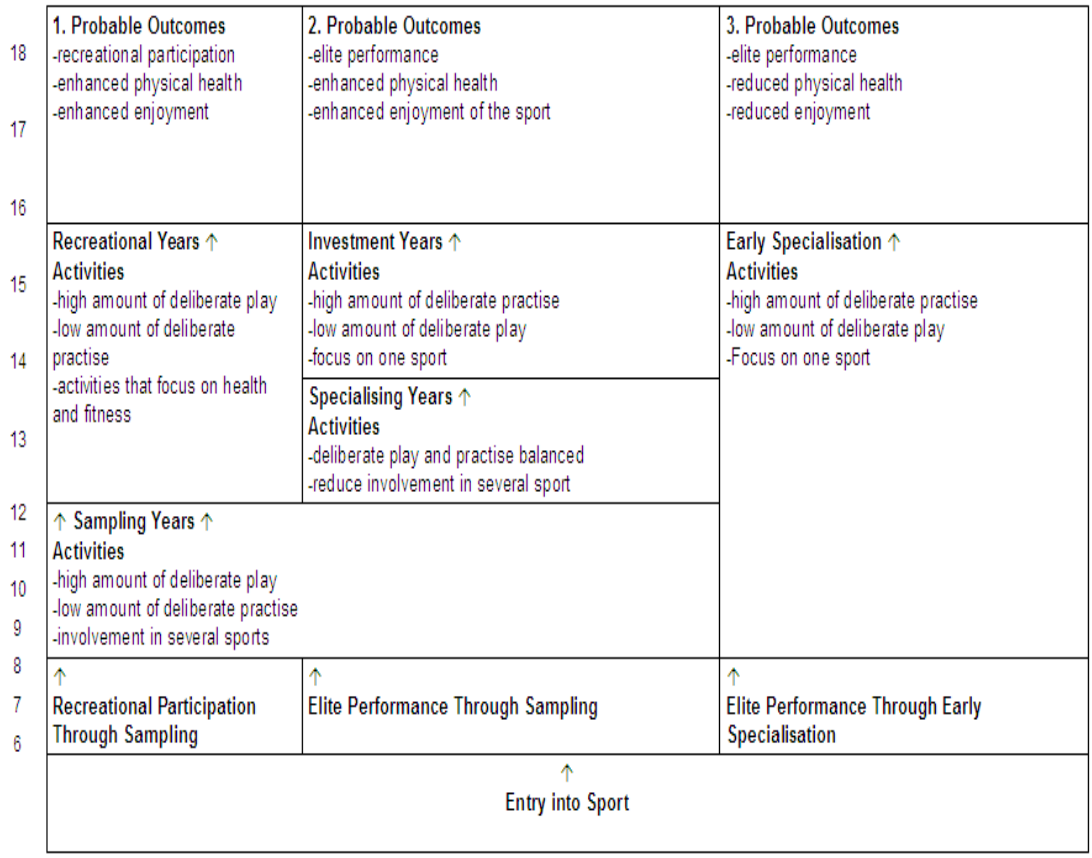

Figure 2.1 The Developmental Model of Sports Participation (adopted from Côté et al., 2007).

It is important to emphasise how Côté and colleagues do acknowledge the contributory role that deliberate practice theory may provide in the development of sporting excellence during the latter teenage years and beyond. However, they disregard its application and appropriateness during a child's early sporting development from between the ages of six and 12 because they may lack the required physical, cognitive,

social, emotional and motor skills required to undertake such strenuous and effortful activities. In its place, they encourage practitioners to assign children with high volumes of fun based, diversified deliberate play activities. Additional aims of deliberate play theory are to minimise dropout, injury and burnout, develop on-going motor development and encourage the progression of independent decision making skills that may be utilised once a commitment to deliberate practice and specialisation occurs in later life (Côté & Fraser-Thomas, 2008). The deliberate play theory specifies how athlete's progress through three stages of development from childhood to adolescence termed the sampling (aged six-12), specialising (13-15) and investment (aged 16 upwards) years. In the sampling stage, individuals are discouraged to participate within any form of structured practice regimes and participate within only deliberate play activities across several sports. The number of sports an individual participates within is refined during the specialising stage where the gradual introduction of structured training is introduced before a commitment to long term deliberate practice within one sport aged approximately 16 (Côté & Fraser-Thomas, 2008).

Support for deliberate play is provided in the study by Barynina and Vaitsekhovskii (1992) which revealed how international swimmers who began specialised swimming training aged between 12 and 13 ended their careers later and spent longer time competing for their national team in comparison to swimmers who specialised earlier at the ages of nine and ten. The research by Cobley and Baker (2005) identified differences in patterns of diversification between the practice trends of national and varsity level female rugby players. They found elite performers accumulated double the volumes of training in sports with high physiological (e.g., athletics, cross country running) and movement-perceptual (e.g., soccer, hockey) resemblance to rugby

compared to their non-elite colleagues between the ages of five and 19. More recently, Bell-Walker and Williams (2009) emphasised how playful deliberate play activities developed game intelligence skills such as anticipation, problem solving and decision making and reduced the potential for burnout and increased an individual's willingness to engage with structured coach centred practice activities in later life. Further support for deliberate play was provided by Soberlak and Côté (2003) who undertook quantitative interviews with four professional Canadian ice hockey players and their parents to determine the amounts of time that professional ice hockey players had spent engaged in deliberate practice, deliberate play, organised games and other sports throughout their development between ages of six and 20. In spite of the small sample numbers and retrospective nature, the findings were consistent with deliberate play theory in that expert status was achieved without significant involvement in deliberate practice activities prior to the early teenage years.

Baker et al., (2003) undertook quantitative interviews to examine the sports participation and practice trends of Australian expert and non-expert decision makers (determined by national level coaches) who competed in a range of sports including basketball, field hockey and netball either internationally or regionally. The expert decision makers consisted of Australian national team players for women's netball (three), men's basketball (four), men's field hockey (four) and women's field hockey (four). A non-expert decision maker sample which had all played their primary sport for more than ten years but had not participated beyond the state level provided comparative data. The study revealed how 14 of the 15 expert athletes had been involved in their primary sport for at least a minimum of ten years (M = 13 years) prior to achieving selection for the national senior level team selection. It was also found how amounts of sport specific deliberate practice undertaken in their primary sport by

the expert sample was found to be far less (M = 4,000 hours) than the well-established 10,000 hours rule that emerged from within the early sports expertise literature base (e.g., Hodges & Starkes, 1996; Helsen et al., 1998). A significant negative correlation was found between the amount of sports undertaken during the expert performers careers and total hours of primary sport specific training undertaken prior to achieving international selection ($r = -.74$, $p < .01$) which suggests early specialisation may not be a necessary requirement for the attainment of senior level excellence in decision making team based ball sports. A key weakness of this study though was how ratings of elite and non-elite decision makers were based purely on the subjective opinions of coaches and not on any direct measure of existing perceptual-cognitive expertise.

Additional support for the theory in developing sporting excellence was provided by the study undertaken by Baker et al., (2005) who examined the applicability of deliberate practice theory to the acquisition of expertise in triathlon. Quantity and types of training performed by expert and non-expert Canadian tri-athletes were obtained via a modified version of the interview schedule proposed by Côté et al., (2005) and the examination of participant training logs. The sample comprised 28 male ultra-endurance Canadian tri-athletes of which nine were classified as experts, nine as intermediate and nine as recreational. The findings do provide partial support for deliberate practice theory as amounts of time spent in sport-specific training was revealed as a key discriminator of experts and non-experts. However, the need for specialised training during early stages of development which is a core principle of deliberate practice was not supported. In summary, all levels of competitors were found to be involved in a range of sports that did not include regular running, swimming or cycling until at least mid-adolescence and differences in amounts of deliberate practice

undertaken in each of the three disciplines did not occur between the elite and intermediate and recreational tri-athletes until aged approximately 20.

Following the methodological recommendations of Williams and Ericsson (2008), Berry et al., (2008) undertook a mixed methods approach to examine if elite and non-elite Australian rules footballers experienced different sporting developments. The sample comprised 17 elite decision makers and 15 less skilled decision makers who undertook a perception and decision making video based task and retrospective interview to gauge previous sports participation and practice trends. The study found elite Australian rules footballers had accumulated more hours per year in deliberate play than non-experts at 12 years of age. Experts also significantly outperformed the non-elite group in recall and prediction accuracy on the video task and experienced more deliberate play within invasion sports during the sampling years.

The recent study by Greco, Memmert, and Morales (2010) examined the effects of a deliberate play training program upon basketball tactical game intelligence and tactical creativity. The sample which comprised 22 male youth basketball players aged between ten and 12 years undertook 18 basketball training sessions in one of two equal-sized groups. The deliberate play training program contained unstructured basketball games where as the placebo group participated in traditionally structured basketball practice. Tactical intelligence and creativity ratings which were assessed pre and post intervention revealed significant training improvement for the deliberate play group in terms of superior tactical creativity and intelligence.

The aim of the research by Henriksen, Stambulova and Roessler (2010a) was to examine key factors behind the history of a Swedish track and field team who have

experienced success in creating international standard track and field athletes. These researchers undertook a multiple perspectives, qualitatively focussed case study including in-depth interviews and observations with 50 athletes aged between 15 and 17 and a small number of coaches and administrators whom represented both genders and various track and field disciplines. The findings of the study reinforce the applicability of deliberate play theory in developing adolescent track and field excellence as the majority of participants were found to have followed a late specialisation trajectory with a gradual move from playful towards structured training during the mid-teenage years. These findings also resonate with Vaeyens et al., (2009) who revealed how the majority of German athletes who competed at the 2004 Summer Olympic Games made their international debuts at senior instead of junior levels of international competition and tended to specialise in their primary sport during the latter teenage years.

Overall, this section of the present chapter has demonstrated how early specialisation and domain specific long term deliberate practice training programmes were not pre requisites for achieving sporting excellence in a range of individual and team based sports. Instead, long term exposure with deliberate play activities were frequently encountered by many sports performers who have gone on to reach the elite senior levels of performance in their respective sporting disciplines. After an introductory period which lasted several years and consisted of unstructured and unsupervised playful experiences, parents typically encouraged their children to attend formalised training sessions that were delivered by a qualified coach and incorporated a mixture of both deliberate play and deliberate practice activities. An increase in amounts of deliberate practice and reductions in deliberate play activities and exposure with superior training facilities tended to occur as participants entered the early to mid-teenage years. Critically however, whilst the research outputs of Côté and colleagues

have had a significant impact upon the recent sports expertise literature, they have relied heavily upon retrospective methodologies, small sample sizes (e.g., Côté, 1999; Soberlack & Côté, 2003) who were most commonly recruited from middle class families which is not representative of all types of family structures experienced by aspiring elite performers. Furthermore, they have not always triangulated data with the accounts of parents, coaches, peers or archived records (e.g., Johnson et al., 2008; Wall & Côté, 2007).

Akin with deliberate practice, the theory has also attracted academic scrutiny from researchers and practitioners who provide evidence to suggest how a disconnection between current theory and practice in talent development research exists (e.g., Abbott & Collins, 2004; Eccles, Ward, & Woodman, 2009; MacNamara & Collins, 2011, 2012; Philips et al., 2010a; Toms, 2005). The key message to emerge from this research is the suggestion how talent development is a non-linear instead of a liner rigid process (as put forward by deliberate play theory) in which no two participants are likely to encounter similar pathways during their quest for achieving sporting excellence. They also claim how popular talent identification and development models such as Balyi`s long term athlete development framework (Balyi, 2001) are focused primarily towards identifying talent according to current levels of physical performance instead of the potential an individual has to achieve.

To elaborate, existing models including deliberate practice and deliberate play are heavily influenced by current physical attributes of the performer rather than skill levels, are likely to exclude or overlook late maturing individuals, have limited regard for the positive role that psychological characteristics may offer and are undermined by an oversimplified conception of what talent entails (Abbott & Collins, 2004; Abbott,

Button, Pepping, & Collins, 2005; Ford et al., 2011; Martindale, 2008; Phillips et al., 2010a; Toms, 2005; Vaeyens et al., 2008; Zieglar & Heller, 2000). These criticisms have encouraged talent development researchers to eschew the notion of common optimal performance development by focussing upon individual performer pathways to excellence and consider how dynamic, multi-dimensional models may provide a more effective description of talent development than traditional models and theories which have perceived talent to be either a linear paradigm or genetically inherited (MacNamara & Collins, 2012).

2.3 Moderators of Talent Development

The development of talent is a complex process mediated by a range of physical, psychological, social and environmental variables (Bloom, 1985; Horton, 2012, Reilly et al., 2000). Therefore, although the primary focus of this thesis was to examine the applicability of the deliberate practice framework in developing elite adolescent golf performance, the next section of this chapter will review the existing literature that has investigated the influence of these wide ranging variables upon the development of sporting excellence.

2.3.1 The Role of Skill Transfer in Talent Development

The belief by coaches that certain sports share common elements and strategies are largely intuitive and anecdotal (MacNamara & Collins, 2011; Musch & Grondin, 2001). An underpinning principle of the diversified developmental approach is the notion of skills transfer across sports (Baker et al., 2009) and support for the transfer across sports paradigm is provided by Abernethy, Baker, and Côté (2005), Baker et al., (2003) and Smeeton, Ward, and Williams (2004). Replicating initiatives undertaken by the Australian Institute for Sport in the 1990`s (e.g., Hoare & Warr, 2000), United Kingdom

Sport implement a talent transfer initiative named Sporting Giants (UK sport, 2008b) with the intention of identify athletes who were currently undetected within their high performance talent development system but had the potential based on a range of physiological and psychological parameters to perform on the international stage in either rowing, volleyball or handball (see Vaeyens et al., 2009 for an overview). Whilst the theoretical underpinnings of the talent transfer paradigm have recently received noticeable criticism (e.g., MacNamara & Collins, 2011, 2012), evidence would suggest how it appears possible to switch from one sport to another at a relatively late stage of a sporting career and a still achieve expert status. To illustrate, the study by Bullock et al., (2009) revealed how a female Australian with a background in wind surfing and no prior experience of participation within the skeleton event went on to represent Australia at the 2006 winter Olympic Games after an intensive 14 month period of skeleton specific deliberate practice training. Equally, ten of the twelve 2004 Olympic finalists in female diving initially started their sporting careers as gymnasts (Vaeyens et al., 2009) and the findings of Baker et al., (2005) revealed how senior level elite tri-athletes only specialised between 16 to 20 years of age after extensive early engagement in various sports including soccer, basketball and long distance running. The aim of the study by Smeerton et al., (2004) was to examine the ability of skilled and less skilled soccer, volleyball and hockey player's to transfer pattern recognition across similar and dissimilar sports. Results revealed both skilled soccer and field hockey performers performed equally well on both the soccer and field hockey tests which suggest they were able to transfer the necessary perceptual skills across the two sports.

These examples suggest skills developed by young children during a diversified sporting environment may be transferable to their chosen sport of specialisation in later life and also reinforces the theory that the accumulation of 10,000 hours of deliberate

practice across a combination of disciplines may be an alternative pathway to expertise (Baker, 2007; Coleman, 2007; Runco, 2007). Research from within the field of cognitive psychology which examined the training regimens of memory experts has also revealed how it may be possible to achieve world class standards of performance after less than two years of sustained deliberate practice training (Ericsson, 2003; Ericsson, Delaney, Weaver, & Mahadevan, 2004). Crucially however, practitioners and sport psychologists must appreciate that the potential to achieve world class status in a limited time frame appears much more achievable within lesser established sporting disciplines that may currently lack any history of organised international competition in comparison to events such as track and field or gymnastics.

2.3.2 The Role of Psycho-Behavioural Factors in Talent Development

A consistent finding to emerge from the sports expertise literature is the central role that psycho-behavioural factors play in developing exceptional levels of performance. This standpoint is supported by a plethora of studies which have revealed how psychological characteristics including higher levels of commitment, focus, persistence, determination, autonomy, self-confidence and motivation can differentiate between elite and non-elite athletes (Bailey & Morley, 2006; Bloom, 1985; Côté, 1999; Gould, Dieffenbach, & Moffett, 2002; Schoon, 2000). A comprehensive volume of research has also demonstrated how elite athletes employ coping skills, goal-setting, focusing and refocusing strategies, competition planning, imagery and work on weaknesses more often than their non-elite counterparts (Gould, Guinan, Greenleaf, Medbery, & Peterson, 1999; Greenleaf, Gould, & Dieffenbach, 2001; MacNamara, Button & Collins, 2010; Orlick & Partington, 1988; Williams & Krane, 2001).

One of the first studies which recognised the importance of specific psychological skills and behaviours in the acquisition of sporting excellence was undertaken by Hemery (1986). This research examined the impact of environmental factors including training histories, social relationships and psychological factors upon the developments of 63 Olympic, world or national standard sport performers from across 22 individual and team sports and 12 countries. The results revealed how participants were highly committed and disciplined in their approach to training which tended to become specialised from approximately 15 years of age. Further support for the role of psychological factors in developing sporting excellence is provided by Vernacchia, McGuire, Reardon, and Templin (2000) and Durand-Bush and Salmela (2002) which examined the psychological and social factors associated with the development of elite world class athletes and extends the knowledge base generated by Bloom and Hemery. Vernacchiaet al., (2000) interviewed 15 North American Olympic track and field athletes and found a strong athlete work ethic, persistence, enjoyment of training and competition and long term social support were important factors that contributed toward on-going personal and athletic development. Durrand-Bush and Salmela (2002) interviewed ten former world and Olympic champions and found the psychological factors associated with the development and maintenance of expert athletic performance included self-confidence, motivation and perseverance.

The research undertaken by Holt and Dunn (2004) which examined the psychosocial competencies and environmental conditions associated with achieving elite adolescent success in soccer also emphasises the importance of psychological skills and behaviours in talent development. This study which utilised academy level Canadian and English soccer players revealed four major psychosocial competencies which appear to be critical for success in elite youth soccer were classified as discipline, resilience,

commitment and social support. International standard youth soccer players also displayed high levels of discipline, commitment and dedication to pursuing a professional soccer career, a willingness to sacrifice elements of their adolescent lifestyles, the ability to overcome personal and contextual obstacles and the ability to utilise available sources of social support. More recent soccer focused research undertaken by Van Yperen (2009) which aimed to identify psychological factors that predicted success in professional soccer found that performers who progressed into professional football reported higher engagement in problem focused coping behaviour, goal commitment and seeking social support in comparison to those who were released. Furthermore, Jones and Lavallee (2009) who undertook focus groups with a mixture of students, male and female coaches, and non-elite and elite athletes revealed numerous interpersonal (e.g., leadership & respect) and personal (e.g., goal setting & motivation) life skills are needed by aspiring and elite adolescent athletes for on-going performance improvements and retention within sport.

The important role that psychological factors may underlay during an aspiring elite athletes development was also highlighted by MacNamara et al., (2010). This study employed semi structured qualitative interviews to examine the psychological attributes perceived by seven world class athletes and their parents to have contributed towards the performers development into a successful and consistent world class sports performer. Whilst achieving expert status in sport was conceptualized as a multidimensional process, psychological factors were highlighted as the key determinants of those participants who emerged as talented and maintained expert performance. A range of themes relating to psychological behaviours including motivation, commitment and resilience were identified which also parallels the findings of research undertaken in music (Kamin, Richards & Collins, 2007; MacNamara,

Holmes, & Collins, 2008) and dance (Van Rossum, 2001). The study also suggested greater emphasis should be placed on developing and applying psychological behaviours and skills from an early age to enhance on-going development and performance outcomes of aspiring elite sports performers. This section of the chapter has introduced a wide ranging body of research which supports the role of psychology as being a significant factor in the development of sporting excellence (Abbott & Colllins, 2004: Abbott, Collins, Sowerby, & Martindale, 2007; MacNamara & Collins, 2012) and encourages future talent development initiatives to place greater emphasis into developing the psychological skills and behaviours of aspiring elite sports performers in the future.

2.3.3 The Role of Social Support in Talent Development

It's well established that parents, peers, teachers and coaches all play a role influencing male and female attitudes and behaviours towards physical activity and sport participation during childhood and early adolescence (Brustad, 1993, 1996; Coakley & White, 1999; Côté, 2002; Côté & Hay, 2002b; Côté, Baker, & Abernethy, 2003; Davison, Downs, & Birch, 2006; Fredricks &Eccles, 2004, Holt, Tamminen, Black, Sehn, & Wall, 2008; Holt, Tamminen, Black, Mandigo, & Fox, 2009; Horn & Horn, 2007; Kirk & Macphail, 2003; Lally & Kerr, 2005; Morgan & Giacoobbi, 2006; Patrick, Ryan, Alfeld-Liro, Fredricks, Hruda, & Eccles, 1999; Scanlan & Lewthwaite, 1986). These wide-ranging influences combined with opportunities to participate and observe, create a powerful social process referred to as socialisation (Greendorfer & Bruce, 1991; Greendorfer, 1993).

Substantial research from within the youth participation literature reveals how the primary drivers of any effective sport development model are financial, emotional and

practical parental support (Coakley & White, 1999; Davison et al., 2006; Fredricks & Eccles, 2002; Green & Chalip, 1997; Kay, 2003; Thompson, 1999; Wuerth, Lee,& Alfermann, 2004) and how parents provide the greatest impact on socialization and play a central role in the development of their child's sporting development throughout childhood and early adolescence (Baker & Horton, 2004; Gould, Lauer, Rolo, Jannes, & Pennisi, 2006, 2008; Holt, Tamminen, Black, Sehn, & Wall, 2008; Jodi, Michael, Malanchuk, Eccles, & Sameroff, 2001; Kay, 2000; Macphail, Gorley, & Kirk, 2003). An important implication to emerge from the literature is how the impact a parent may have upon the development of their child's sporting career appears to diminish as they approach mid-adolescence and coach, teacher and peer input starts to become more significant. This is reflected in a range of studies which have found how children assign significant influence to the role of peers in shaping their sports participation trends during the adolescence years (e.g., Bois, Sarrazin, Brustad, Trouilloud, & Cury, 2002; Coleman & Roker, 1998; Fredricks, Alfeld-Liro, Hruda, Eccles, Patrick, & Ryan, 2002; Fredricks & Eccles, 2004; Horn & Weiss, 1991; Lauer et al., 2010a; Patrick et al., 1999; Weiss & Barber, 1995; Wolfenden & Holt, 2005; Woolger & Power, 1993).

This finding was further emphasised by Smith (2003) and Patrick et al., (1999) who alleged peer relationships played a crucial role in youth sports and Weiss and Weiss (2004) who identified how sports participation trends of best friends were a strong predictor of adolescent sport commitment and involvement. The research undertaken by Abernethy, Côté, and Baker (2002) also demonstrated the influential role that individuals may play in determining the sports participation trends of their peers as 15 Australian elite team sports athletes all possessed close friends who competed in similar sports during the initial stages of their careers. The youth sports participation literature has also revealed how both sport and physical activity participation patterns undertaken

by children generally parallel those of their parents (Côté, 1999; Davison, Downs, & Birch, 2006; Scheerder et al., 2006; Stevenson, 1990) and a collection of positive (emotional & tangible support) and negative (pressure) influences that parents have tended to inflict upon their children throughout their sporting careers (Brustad & Partridge, 2002; Horn & Horn, 2007; Lauer et al., 2010a, 2010b; Partridge, Brustad & Babkes Stellino, 2008, Wolfenden & Holt, 2005).

Parents also need to be aware of any unintentional pressures they may display or exert upon their child if they are to remain actively engaged within sport (Young & Medic, 2008) as children have been found to report enhanced enjoyment in sport when they perceive their parents are positively involved with their sport participation (McCarthey & Jones, 2007). To emphasise this point, studies by Gould, Eklund, Petlichkoff, Peterson, and Bump (1991) and Leff and Hoyle (1995) reported elevated child anxiety levels when they perceived their parents as over involved, upholding excessively high expectations and exerting significant pressure to perform. Likewise, Gould et al., (1996a, 1996b) found increased anxiety, dropout and burnout levels were positively associated with high amounts of parental pressure, criticism and expectation and low amounts of parental support. Hill and Hansen (1988) also revealed how parents often inflicted considerable pressure upon their children by encouraging them to undertake specialisation pathways through funded instruction and providing sport specific facilities in the home. Similarly, research by Barber and Sutko (1998) revealed parent coaches can inflict negative influences upon their child's sport participation if they become over involved and place unreasonable and unrealistic pressures upon them to achieve.

The critical roles that coaches are encouraged to undertake throughout an athlete's development are well publicised in the deliberate play and diversification literatures (Bloom, 1985; Côté, 1999; Côté & Fraser-Thomas, 2007; Fraser-Thomas et al., 2008a, 2008b; MacPhail & Kirk, 2006; Wiersma, 2000, Zaichkowsky, & Haberl, 1999). This literature encourages coaches to delay exposing their athletes with specialised training until athletes are both physically and psychosocially mature enough to cope with the physical and mental requirements of deliberate practice and ensuring how practice environments are fun, athlete centred and task motivated. Further examples of effective coaching practice include dividing attention to all participants, placing athletes with peers of similar age groups and maintaining effective and regular communication with parents. The research by Gould et al., (1996a, 1996b), Pelletier, Fortier, Vallerand, and Briere, (2001) and Price and Weiss (2000) further revealed how athletes are increasingly vulnerable to reductions in motivation to participate, dropout and burnout when they encounter coaches who employ autocratic delivery styles and provide poor social support including unrealistic expectations and lack of empathy. Together, the findings of Côté and colleagues over the past decade in addition to Holt and Dunn (2004) and Hunt (2006) suggest how maintaining a long term commitment to achieving expert status will remain if individuals experience initial success, enjoy the activities they are involved within and receive encouragement and support within their social climate.

A recurrent finding within the studies undertaken by Bloom (1985), Hemery (1986), Durand-Bush and Salmela, (2002), Gould et al., (2002) and Vernacchia et al., (2000) was how internationally recognised performers in sport, art and science were introduced to their respective domains by parents and all experienced substantial encouragement advice and guidance from various social contexts. This research also revealed how

sizable long term financial contributions were made by parents towards their child's teaching and equipment costs and extensive amounts of time were devoted to transporting their children to and from training and competitions. The extreme measure of a family relocating to be closer to a coach and training facilities was also reported. The contributory role of social support in acquiring excellence is also evident throughout the mainstream expertise literature (see Meig, 2006 for an overview). For example, Gardner's (1993) study demonstrated how support mechanisms provided by family and friends enabled outstanding contributors to society to remain single minded and focussed throughout their development.

2.3.4 The Role of Motivation in Talent Development

A long term motivation to succeed and the commitment required to undertake long-standing practice regimes are critical pre-requisites on the journey to developing sporting excellence (Young & Medic, 2008). In agreement, Starkes and Helson (1998, p.425) stated "if practice is what it takes to become an expert, motivation to practice and early emotional connection to that experience must be crucial." Indeed, the importance of determining what it is that motivates individuals to spend the time undertaking the necessary hours of practice to achieve expertise was a recommendation for future research provided by Hodges and Starkes (1996) over 15 years ago. A well accepted finding to emerge from the sports expertise literature is how elite adolescent athletes are highly motivated to succeed in sport. For example, the research by Toering, Elfering-Gemser, Jordet, and Visscher (2009) showed how elite youth soccer players were more willing to invest high levels of physical and mental effort into their day to day development when compared with non-elites. Comparable findings we found in the study by Jonker, Elferink-Gemser, Toering, Lyons, and Visscher (2010) which established how elite youth soccer players in Holland undertook larger volumes of

reflection and placed more effort into becoming successful than a sample of non-elite participants.

A key principle in theories of motivation is the need for the individual to demonstrate competence as individuals are more likely to strive for excellence and dedicate the time needed to undertake the required training regimes in areas where they can demonstrate such behaviours (Ryan & Deci, 2000). Perceived competence refers to an individual's judgements about their ability in a specific sporting activity (Young & Medic, 2008) and is an important factor in ensuring continued participation beyond recreational levels of performance and sustaining commitment within an achievement domain (Mallett & Hanrahan, 2004). When a task is challenging and successful mastery is achieved, the increased intrinsic motivation that accompanies greater perceived competence is likely to activate commitment towards the domain (Nicholls, 1989). Improvements in performance have also been found to stimulate an individual's motivation for additional learning (Young & Medic, 2008) and Lens and Rand (2000, p.199) proposed that "individuals like to do things they are good at and they also become good at things they like to do". They explain how an individual is likely to invest far greater time and become increasingly motivated to achieving a challenging task (e.g., expert status as a sports performer) so long they possess the confidence that that they can ultimately achieve this goal than when they engage within a non-challenging task or have a low perception of self-competence.

Individuals have been found to use two major types of goals when attempting to demonstrate high ability in achievement contexts (Nicholls, 1984). Task goals are associated with learning new skills or improving standards of performance and task-oriented performers are highly motivated by self-referenced personal improvement

which is associated with a sense of achievement and an enhanced perception of competence (Nicholls, 1989). Alternatively, ego-oriented goals are directed towards winning and perceptions of success are reliant on winning with minimal effort. Consistent with the predictions of self-determination theory and achievement goal theory, research has shown that a high task disposition tends to correlate positively with higher levels of intrinsic motivation and a high ego disposition is more likely to be associated with decreased intrinsic motivation levels (Duda, Chi, Newton, Walling, & Catley, 1995). In one of the few studies to examine the relationship between motivation levels and elite sports performance, Mallet and Hanrahan (2004) investigated the motivational forces and processes behind elite performance in sport through qualitative interviews. The sample comprised ten Australian elite track and field athletes who finished in the top ten at Olympic Games and World Championships between 1995 and 2000. Although data was not triangulated with coaches, parents or peers, the study revealed how the participants were highly driven to succeed by personal goals and achievement, possessed strong self-belief and track and field was central within their lives.

The findings of Ericsson and colleagues provide support for the assumption that commitment to long term deliberate practice is a primary factor that distinguishes experts and non-experts who may struggle to undertake the excessive practice demands required. According to Ericsson et al. (1993), individuals are motivated to undertake physically and mentally demanding practice regimes because they aspire to continually improve their levels of performance. This type of motivation is referred to as achievement motivation (Ames, 1992). Bruin, Rikers, and Schmidt (2007) examined the influence of achievement motivation and chess specific motivation on deliberate practice in dropout and current elite adolescent chess players. Competitiveness and the

will to excel proved to be predictors of investments in deliberate practice and achievement motivation and chess-specific motivation levels differed between current elite and dropouts. These findings suggest how the motivation to engage in deliberate practice contains elements of the will to improve and attain exceptional levels of performance of expertise.

Scanlan, Carpenter, Schmidt, Simons, and Keeler (1993) devised a model of sports commitment which enabled motives for participation in sport and physical activity to be explored. The Sport Commitment Model highlights five factors that impact the desire to sustain participation and includes enjoyment, involvement alternatives, personal investment, social constraints, involvement opportunities and attractive alternatives (Ward et al., 2004). Scanlan et al.,'s (1993) model which specifies how enjoyment levels tend to be positively related to commitment oppose the findings of Ericsson et al.,'s (1993) but support the findings of Hodges, Helsen and colleagues and their studies within individual and team based sports which found a positive relationship between amounts of enjoyment experienced and effort exerted in individual and team based practice sessions. At face value, the model implies how the enjoyment and involvement opportunities associated with one sport must outweigh the attractiveness of all alternative activities if aspiring elite athletes are to continue with their primary sport through the teenage years and beyond (Young & Medic, 2008).

Csikszentmihalyi, Rathunde, and Whalen (1993) claimed individuals who possess high rather than low levels of intrinsic motivation will be more committed to their domain and Ericsson (1998) agreed that engagement in intrinsically motivating learning environments during the early stages of an individual's career is likely to increase their eagerness and enthusiasm to pursue more externally controlled activities such as

deliberate practice in the future. Côté and colleagues also emphasise the potential long term motivational benefits of deliberate play over deliberate practice theory deliberate as this learning environment encourages the creation of a task focussed motivational climate which promotes intrinsic motivation levels, increased self-determination and independence through solving one's own problems and commitment which has been identified as critical for continued participation within sport and physical activity (Côté & Fraser-Thomas, 2007, Côté & Fraser-Thomas, 2008; Côté et al., 2009; Dietrich, 2004; Runco, 2007). The suggestion how informal practice may be intrinsically enjoyable is deep rooted within deliberate play theory (Côté, 1999) which emphasises the importance of fun and autonomy supportive coaching whereby they are active participants in the process of planning, monitoring and evaluating for continued participation and development in sport (Berry et al., 2008).

The influential roles provided by family, peers, coaches and teachers in maintaining an athlete's motivation to learning over the long term is another common finding within the talent development literature (Côté et al., 2003; Holt et al., 2008; Keegan, Spray, Harwood & Lavallee, 2009; Keegan, Spray, Harwood, & Lavallee, 2010; Starkes & Ericsson 2003; Young & Medic, 2008). To illustrate, Babkes and Weiss (1999) demonstrated how children reported superior athletic competence and intrinsic motivation levels when they acquired positive feedback on a regular basis from their parents. The findings of Brustand (1996) and Kimiecik and Horn (1998) also emphasised how parental behaviours and support mechanisms may positively influence their children's psycho-behavioural development in sport and research by Duda and Horn (1993) and Ebbeck and Becker (1994) identified how children's perceptions of their parent's goal orientations were significantly related to their own. More recently, Phillips and Lindsay (2006) undertook semi structured interviews with 15 gifted

students aged between 14 and 15 years and their parents and teachers to investigate factors which influenced the motivation required to acquire the superior levels of academic achievement encountered. Data revealed the role of challenging, high quality teaching and learning, involvement in various extracurricular activities and leisure pursuits and the role of support from home and the school was influential in maintaining student motivation levels.

2.3.5 The Role of Self-Regulation in Talent Development

The benefits of using self-regulatory skills to learn more efficiently and improve performance is well publicised in sport and other disciplines. Zimmerman (2000, 2006) described self-regulation as the extent to which individuals are meta–cognitively, motivationally, and behaviourally proactive participants within their own learning process. A range of studies within academia (Zimmermann, 1986, 1998, 2002), music (Cleary & Chen, 2009; Miller, 2000, Nielsen, 2001), and sport (Anshel, 1995; Anshel & Porter, 1996; Cleary & Zimmerman, 2001; Ertmer & Newby, 1996; Jonker, Elferink-Gemser, & Visscher, 2010; Jonker, Elferink-Gemser, Toering, Lyons, & Visscher, 2010; Petlichkoff, 2004; Toering, Elfering-Gemser, Jordet, & Visscher, 2009) reveal how experts take greater responsibility for their own development, self-monitor their progress, manage their emotions, focus on self-improvement, are aware of their strengths and limitations, set realistic goals to make progress in terms of performance, seek assistance from peers when necessary and score higher on aspects of self-regulation of learning including reflection and effort when compared with non-experts.

What we know from the existing research is that elite level athletes take greater control over their learning and display resilience, commitment and self-discipline when they self-regulate. Individuals without these skills rely more heavily on others, fail to take

responsibility for their own continuing development and should be encouraged to develop a greater sense of self-control over their feelings by self-evaluating and monitoring instead of relying on the guidance and instruction of peers (Dweck, 2008; MacNamara & Colins, 2012).

A growing amount of research indicates how elite adolescent and senior level sports performers possess refined self-regulatory skills which they employ more frequently than peers competing at lower standards. For example, Anshel and Porter (1996) examined the differences in use of self-regulation in elite and non-elite male swimmers and found elite participants were more self-directed, independent, self-confident and focussed than non-elite colleagues.

The study by Jonker et al., (2010) found junior international individual and team sport athletes outscored junior national individual and team sport athletes on planning, reflection and effort ratings whilst Toering et al., (2009) who examined the relationship between self-regulation and performance level in 11 to 17 year old soccer players at elite and non-elite levels of performance found elite youth soccer players employed reflective skills more often and exerted greater levels of effort into executing their performance correctly than non-elite counterparts. Overall, these studies revealed how athletes who failed to self-regulate were less likely to achieve excellence or achieve their potential and imply that child and adolescent coaches should develop learning environments from a young age which allow athletes to take control of their own learning and refine their self-regulatory skills so they are able to undertake the volumes and intensities of practice required to achieve elite status in later life as a senior level performer.

2.3.6 The Role of Social Economic Status in Talent Development

Research has also shown how children from middle class backgrounds are more likely to participate within a greater number of sports and receive additional support to do so from family members when compared with peers from lower income families (Lin-Yang, Telama, & Laakso, 1996; Rowe, Adams & Beasley, 2004; Van Deventer, 2000; Zeijl, TePoel, Du Bois-Raymond, Ravesloot, & Meulman, 2000). To illustrate, the study by Rowley and Graham (1999) found excessive time demands and the financial cost associated with on-going participation in intensive training led to increased drop out of children from predominantly working-class and single-parent families compared to middle and upper class families. Overall, the existing social economic status and sports participation research suggest individuals from higher as opposed to lower socioeconomic status backgrounds have tended to experience greater opportunities and support to continue participating in sport throughout their lives.

2.3.7 The Role of Relative Age Effects in Talent Development

Talent development researchers are in agreement that world class sporting performance is a result of the interaction of numerous factors (Pienaar, Spamer & Steyn, 1998; Reilly et al., 2000). However, one factor that is now well acknowledged as influential in the development of elite sports performers is the relative age effect phenomenon which relates to the skewed birth date distribution favouring individuals born in the initial months of a selection year (Barnsley, Thompson, & Barnsley, 1985; Cobley, Baker, Wattie, & Mckenna, 2009; Musch & Ray, 1999; Musch & Grondin, 2001; Wattie, Cobley, & Baker, 2008; Weir, Smith, Paterson, & Horton, 2010). The outputs from research which has explored the applicability of this theory over the past three decades has revealed how males and females born in the first half of a selection year for sport are far more likely to be perceived as talented and selected for teams by their coaches,

teachers and peers based on a range of superior performance and anthropomrtric measures due to their enhanced physical and cognitive maturity in comparison to peers born in the latter half of the selection year. This selection inequality trend within sport persists throughout child, adolescent and professional competition worldwide. Evidence of a recurring relative age effect has been observed across a range of sports including ice hockey (Barnsley et al., 1985; Boucher & Mutimer, 1994), soccer (Barnsley, Thompson, & Legault, 1992; Brewer, Balsom, & Davis, 1995; Helsen et al., 1998; Musch & Hay, 1999; Verhulst, 1992) cricket (Edwards, 1994), baseball (Thompson, Barnsley, & Stebelsky, 1991), tennis (Dudink, 1994) and netball (O`Donogue, Edgar, & McLaughlin, 2004). In summary, whilst more prevalent in highly competitive and popular male disciplines (Horton, 2012), these findings signify how physical maturation characteristics may determine which sports performers receive increasing access to training resources and coaching throughout their development.

2.3.8 The Role of Relative Birth Place Effects in Talent Development

There is a strong argument developing within the talent development literature which suggests how being raised in a sparsely populated environment is also advantageous for achieving expert status as a sports performer (see Horton, 2012 & MacDonald, Cheung, Côté, & Abernethy, 2009 for an overview). One of the first studies to investigate this theory was undertaken by Côté, Macdonald, Baker, and Abernethy (2006) who examined the population size of locations where elite American football, basketball and golf performers were raised and resided during their childhood and adolescent years. The findings revealed how living in a city with a population of less than 500,000 inhabitants significantly increased the likelihood of becoming an elite athlete in later life. In support of these initial findings, the birth place effect has also been identified in ice hockey (Baker & Logan, 2007), American football (MacDonald et al., 2009) and

soccer and golf (MacDonald, King, Côté, & Abernethy, 2009) where it was revealed how elite male and female athletes were less likely to originate from very small or exceptionally large cities. In summary, whilst large cities may provide greater exposure to resources (e.g., well equipped sporting facilities and more qualified coaches), it appears that aspiring elite athletes may benefit developmentally through living in a smaller, less populated and resource rich environment. Although the majority of the existing research has been undertaken within North America, the implications of these studies imply how the population of a neighbourhood in which an individual is born and raised may have a considerable influence upon the types of sporting activities they will be exposed to and their long term participation and performance level trends.

2.4 Justification for a Mixed Methodological Approach

Recent studies has revealed the unique nature of talent development pathways encountered by elite sports performers and encouraged future sport specific talent development research to avoid the notion of a generic optimal performance development by focussing instead upon unique individual performer pathways (e.g., Abbott & Collins, 2004; Abbott, Button, Pepping, & Collins, 2005; Phillips et al., 2010a; Toms, 2005). For this reason, employing a mixed methods approach to undertake future talent development research may be a more compatible approach for exploring and understanding the unique experiences that sports performers encounter as they develop. A further criticism of the existing literature has been the tendency to rely solely on a single strategy as opposed to mixed approaches which may restrict the potential to explore the multifaceted talent development process and explain the meanings of findings obtained (e.g., Côté, 1999).

Quantitative and qualitative approaches represent contrasting and distinct views of the research process (Creswell, 2008). Quantitative methodologies are characterised by testing theories and hypotheses and a structured data collection process in which researchers undertake a reasonably passive and distant role in the data collection process. On the other hand, qualitative methodologies embrace a humanistic perspective which focuses on the individual and the meanings they attach to the world or environment they live in (Bryman, 2008). As there are strengths and weaknesses associated with the range of methodologies that have been employed within the existing sports expertise literature (Holt & Dunn, 2004), a growing amount of researchers have encouraged the use of mixed paradigms and methods in the research process (e.g., Biddle et al., 2001; Creswell, 2008). Hardy and associates (1996, p.259) also stated "at times it is best to use qualitative methods, and at other times a quantitative approach. Since both methods have strengths and limitations, sometimes it may also be advisable to combine the two approaches". Prior to the 1970`s, the quantitative approach to undertaking research which embraced a natural science model was the dominant paradigm within the social sciences. However, the philosophical debates concerning the value of combining both quantitative and qualitative approaches to research have receded in recent decades and mixed methods research has become both well accepted and utilised since over the past forty years within disciplines including nursing, management and health (Creswell, 2008).

Mixed methods approaches to research differ from multi-methods approaches in that they adopt a mixture of ontological and epistemological positions that complement each other (Creswell & Plano, 2006). Smith (2010, p.202) defined mixed methods research as "a research strategy that involves mixing or combining quantitative or qualitative research approaches, concepts, techniques, and methods into a single study". He also

stated how mixed method research designs are an effective strategy to employ when examining a particular concept that is best understood through both exploration and explanation. Although not as popular as single or multi-approaches, examples of mixed methodology talent development research do exist in the extant sports expertise literature. For example, Gould et al., (1996a) incorporated mixed methods to examined burnout in competitive junior tennis players in which a range of quantitatively focused psychological assessments and qualitative interviews were undertaking. This aim of this approach was to produce data whereby the qualitative findings (e.g. characteristics and reasons for burnout) would offer explanation and meaning to the quantitative data initially collated (e.g. demographic, social and psychological differences between those who did and did not suffer burnout). More recently, Weissensteiner et al., (2008) used a mixed methods approach comprising a laboratory based batting task and retrospective interviews to examine the link between anticipation skills of high performing and recreational cricket batsmen and their sports participation and practice histories.

Smith (2010) also discussed how mixed methods research capitalises on the strengths of different approaches, increases the validity of research findings and allows for deeper examination of behaviours and meanings in sport from a much wider perspective. According to Johnson and Onwuegbuzie (2004), mixed methods designs may also add insight and understanding to a research project that may have been overlooked by single approaches in the past and enable researchers to answer a more complete range of research questions as they are not confined to a single approach. From a negative viewpoint, they also acknowledged how mixed methodology research may be expensive and time consuming to undertake and is generally reliant on more than one researcher as it may be difficult to carry out both qualitative and quantitative research individually, especially if the two or more approaches are used simultaneously. An example of this

approach would be data separation analysis (Creswell, 2008) which comprises both quantitative and qualitative data sets being analysed separately where one does not influence or inform the other will be adopted throughout the thesis. Mixed methods designs can also utilise either a parallel or sequential design to collate data. The parallel approach involves the collection of quantitative and qualitative data during the same time phase of a research study whereas the sequential design comprises quantitative and qualitative approaches occurring in a sequence with one phase occurring before the other (Smith, 2010). Subsequently, this thesis combined both quantitative and qualitative approaches to undertake research into the role of deliberate practice in developing adolescent golfing excellence. It is hoped the aims and objectives of the thesis may be best answered through this approach and allow for greater scrutiny into the sport participation trends and types, amounts, intensities and durations of practice regimes which differentiate elite and aspiring elite adolescent golfers.

2.5 Chapter Summary

Although a comprehensive amount of research has examined the role that deliberate practice regimes, in addition to a host of psychological, social, physical and environmental variables may play in developing elite level sports performers over the past two decades, the framework has yet to be applied to golf. Therefore, the purpose of this thesis was to undertake four studies which examined the applicability of deliberate practice theory in developing adolescent golfing excellence. As little is currently known about the types and amounts of golf activities and training that may prove key for acquiring this level of performance, it is hoped the findings of this thesis provide practitioners and policy makers who work within golf talent development systems with stronger evidence to nurture exceptional levels of adolescent golf performance in the future.

CHAPTER 3

STUDY 1

A LONGITUDINAL ANALYSIS OF GOLF ACTIVITIES UNDERTAKEN BY ASPIRING ELITE ADOLESCENT GOLFERS

In the previous chapter, it was proposed how long term engagement with deliberate practice may play a crucial role in the eventual acquisition of senior level sporting excellence (see Côté & Fraser-Thomas, 2007; Côté et al., 2007; Williams & Ford, 2008 for an overview). The overarching finding from this literature is the suggestion that sporting excellence is only achievable if at least ten years or 10,000 hours of deliberate practice is undertaken during an aspiring elite performer's development (Ericsson et al., 1993). To illustrate, research has revealed how long term deliberate practice regimes played a key role in the development of exceptional levels of performance in cricket (Weissensteiner et al., 2008), figure skating (Hodges & Starkes, 1996), soccer (Helsen et al., 1998; Ford et al., 2009) and rhythmic dancing (Law et al., 2007) where in all cases, more hours of sport specific deliberate practice were undertaken by experts in comparison to non-experts.

Key in this theory is that training activities must be designed to specifically improve an individual's performance and mere engagement in the activity is not sufficient. Deliberate practice activities are characterised by high levels of physical effort and concentration, are not intended to be enjoyable or lead to immediate social or financial rewards and are performed solely for the purpose of performance enhancement rather than enjoyment (Ericsson at al., 1993).

Justification for Using Longitudinal Self-Report Diary Logs

From a methodological perspective, a criticism of the existing talent development literature has been the tendency to scrutinise the sports participation and practice histories of elite and non-elite senior level sports performers using a range of retrospective methodologies which include qualitative interviews (Bloom, 1985; Côté, 1999; Durrand-Bush & Salmela, 2002; Fraser-Thomas et al., 2008b; Johnson et al., 2008; Lidor & Lavyan, 2002), quantitative interviews (Baker et al., 2003; Baker et al., 2005; Baker et al., 2006; Berry et al., 2008; Ford et al., 2010; Soberlak & Côté, 2003) and quantitative questionnaires (Ford et al., 2009; Ford & Williams, 2008; Hodges & Starkes, 1996; Wall & Côté, 2007; Ward et al., 2007). Many of these studies have also failed to verify participant accounts altogether (Wall & Côté, 2007; Ward et al., 2007) or done so by retrospectively interviewing significant others instead of longitudinally tracking developments as they occur (Côté, 1999; Durand-Bush & Salmela, 2001; Johnson et al., 2008; Soberlak & Côté, 2003).

Sosniak (2006, p.288) defined retrospective interviews as "biographical studies that reflect life histories and experiences by allowing individuals to present their life story within the theoretical framework of the interviewer." An important assumption of retrospective methodologies is how individuals are able to produce accurate accounts of their previous sports participation and practice trends and behaviours. This theory was questioned however by Deakin and Cobley (2003) after they observed figure skating training sessions to identify if amounts of time spent undertaking practice correlated with recalled estimates and found a weak correlation between data. From the coping literature, it is well known that individuals might forget or over-report in what they actually do (Stone et al., 1998), whilst we also know that participants may report retrospective bias or add effort after meaning when they report practice behaviours

depending on success in effort resolving situations (Brown & Harris, 1978). Knowledge of results has also been found to influence the accuracy of retrospective recall in sport (Brewer, Van Raalte, Linder, & Van Raalte, 1991).

Talent development researchers have made use of diary logs in recent years because unlike retrospective methods, they allow for precise measures of data including the duration, type, and intensity of training undertaken to be documented over periods of time. Employing diaries to validate practice estimates was first conducted in the research by Ericsson et al., (1993) which found participants who retrospectively estimated undertaking more hours of practice also recorded more hours in their weekly diary logs. The opposite was found by Hodges and Starkes (1996) who found figure skaters and wrestlers tended to overestimate the amounts of practice they thought they had actually undertaken when compared with the actual amounts logged in weekly diary logs. These findings led Ericson and Lehmann (1996) to suggest how the tendency for participants to overestimate may be attributed to them recalling the amounts of time that they aspired to spend practicing instead of what they actually did. These studies also obtained retrospective estimates using 'forward-recall' which involves participants having to remember the types and amounts of activities they undertook chronologically from the first year of participation towards the current day. However, a change in approach was adopted by Hodges et al., (2004) and Baker et al., (2003) who used "backward-recall" which required participants to retrospectively recall data starting from the present day and preceding back in years. This method appears to be effective as analysis of data revealed there were no significant differences between retrospective estimates and actual diary log data provided in any of the three studies.

Whilst Williams and Ericsson (2005) acknowledged the merits of using retrospective methods to explore practice history trends by suggesting they may be appropriate in providing a general description of activities that have led to expert and non-expert performance levels, they also raised concerns over the validity of any data collated using this method by suggesting it has tended to focus primarily on the macro rather than the micro structure of practice. A drive to move beyond retrospective recall methods has been suggested by Deakin, Côté, and Harvey (2006) who recommended that talent development researchers may wish to use diary logs as an alternative to capture that essence of concurrent developmental activities undertaken by aspiring elite performers. Bolger, Davis, and Rafaeli (2003) and Sirard and Pate (2001) also endorsed this approach by suggesting self-report diary methods avoid many pitfalls of retrospective reporting whilst Armstrong and Welsman (1997) stated that diary logs are a superior means of data collection in comparison to retrospective questionnaires or interviews.

A shortcoming of sports expertise researcher has been the tendency to overlook longitudinal methodologies as a means of tracking the developments of aspiring elite sports performers over extended periods of time. In a drive to increase the amounts of longitudinally focussed talent development research, Gould et al., (2002), Henriksen et al., (2010a, 2010b), Holt and Dunn (2004), Lauer et al., (2010a), Sonnentag and Kleine, (2000), Strachan et al., (2009) and Wolfenden and Holt (2005) have all called for future studies to track the day to day developments of elite and aspiring elite sports performers. The research by Holt et al., (2008) which used audio diaries and observations over a six week period to examine the influence of parental support within the development of female youth soccer players also encouraged future talent development research to utilise diary logs over extended periods of time. They

explained how this data collection tool may enable researchers to obtain greater depth and capture detailed insights into the content and duration of practice activities undertaken such as the differences in amounts of practice and deliberate practice undertaken by participants, length of any rest periods and time spent receiving feedback from coaches. Research has also revealed how longitudinal research designs are less confounded by forgetting, are more sensitive to developmental changes experienced by participants when compared with retrospective methods and may generate increasingly accurate evidence to guide future talent development research, practice and policy making (Willett, Slinger, & Martin, 1998).

The drawbacks associated with longitudinal research are well documented within the literature and must also be acknowledged (see Matton et al., 2007 for an overview). Primarily, this approach is time consuming, highly reliant upon participant adherence and potentially expensive which may explain why talent development research has tended to retrospectively examine the development of elite and non-elite senior level sports performers in the past (e.g., Côté, 1999; Ford & Williams, 2008; Henriksen et al., 2010a; Johnson et al., 2006; MacNamara et al., 2010). Researchers may have also neglected longitudinal methods as there are no guarantees based on current performance levels during childhood and adolescence that a participant will go on to achieve elite status in the future. Yet importantly, research of this nature may prove beneficial as it could highlight any physical and psychological factors which consistently discriminate between those who achieve expertise and those who do not.

The decision to utilise self-report diary logs over an extended time period in this study was made as this method moves beyond retrospectively obtaining estimated amounts of practice undertaken and towards accurately identifying the microstructure of day to day

activities as they unfold over time. Talent development in golf is an under researched area and no studies to date have employed longitudinal methods to examine the day to day practice activities of aspiring elite adolescent golf performers and compared actual and recalled data. This approach also represents a shift away from retrospective methods which have dominated the existing literature base and may help to determine the accuracy of this approach over a nine month period. Therefore, the primary purpose of this study was to use self-report diary logs to track day to day golf activities undertaken by nine aspiring elite adolescent golfers considered to have potential for eventual excellence in golf as it unfolded over a nine month period. The second purpose was to compare actual training volumes and ratings for mental and physical effort exerted and fun experienced with recall once the study was terminated.

Method

Participants

After gaining ethical approval from the ethics committee at the local university, nine male adolescent amateur golfers (M age = 17.2, SD = 0.97) with a handicap between three and six (M handicap = 4.2, SD = 1.1) were recruited. All participants were full time Further Education students undertaking a golf specific Advanced Apprenticeship in Sporting Excellence (AASE) qualification at an academic institution located in Northern England. This qualification supports aspiring elite golfers aged between 16 to 18 who demonstrate the talent and commitment to achieve eventual excellence as a senior level golfer. The competitive playing experience of all participants ranged between two and four years. All participants were county standard golfers who had competed in club and under 18 county competitions for either Cheshire, Lancashire,

Merseyside or Yorkshire throughout the 2009-2010 golf season and provided informed consent prior to participation in the study.

Procedure and Apparatus

Part One: Self-Report Diary Logs

Once the researcher had explained the aims of the study to the institutions head golf coach, permission was granted to recruit participants by attending an AASE squad development event which took place in June 2009. This event enabled information about the study and the commitment required by consenting participants to be explained to all squad members and coaching staff via a brief presentation by the researcher. In total, nine participants volunteered to take part in the study. Verbal and written information which explained the procedures and requirements to be followed was provided to all participants on an individual basis. Biographical information and annual golf handicap trends from childhood to the present day were also obtained for each participant at this event through a generic questionnaire (see appendix A).

Prior to data collection, two professional golfers completed a draft diary log for a seven day period and their feedback regarding the efficacy of the data collection tool highlighted three clear limitations. Firstly, both participants felt the diary logs took too long to complete and secondly, they both raised concerns over the layout of the diary. They also recommended the wording of selected passages of text should be simplified and for more space to be provided for participants to insert data. Therefore, as a primary aim of the diary logs was to foster high adherence and completion rates, time was spent ensuring diary logs were easily understandable and quick to complete for participants.

Over a nine month timeframe, nine participants completed four separate diary logs (see appendix A) which required them to provide insights into the types, volumes, durations and intensities of golf activities they had undertaken. Diaries were based on previous work by Côté et al., (2005) and completed for a seven day period which commenced on the 1st day and ended on the 7th day of every month during October 2009, January 2010, April 2010 and June 2010. Participants also rated on a scale (zero resembling *'very very low'* and ten *'very very high'*) the amounts of mental and physical effort exerted and fun experienced for every golf activity undertaken each day and a brief written justification for each rating provided (see appendix A for a copy of the completed diary log exemplar provided to all participants).

Collectively, the researcher and participants decided the most convenient time to complete the dairy logs was between 20.00 and 22.00 hours for each consecutive day. To aid diary completion rates, participants received a telephone call from the researcher on the evening of the initial day of each week throughout the study and the morning of every third day hence. If participants failed to complete a daily entry, they were instructed to leave the page blank rather than complete it retrospectively. An instructional guide was provided in each weekly diary log which reinforced the responsibilities and requirements expected of all participants throughout the study (see appendix A). Emulating previous research with adolescent golfers (e.g., Nicholls, Holt, Polman, & James, 2005), diaries contained seven individual logs to document daily golf activities undertaken each day, a consent form and an exemplar diary entry. Diary logs were also administered and collected personally by the researcher on a weekly basis in an effort to raise adherence and completion rates (Nicholls & Polman, 2007; Polman, Nicholls, Cohen, & Borkoles, 2007).

Part Two: Accuracy of Retrospective Recall

Interview Protocol

Part two of the study took place in June 2010. All participants were guided through a retrospective interview schedule which focussed on retrieving data which highlighted patterns, volumes and intensities of golf activities undertaken over the past nine months. Specifically, for each particular week in which the participants completed the self-report diary logs, they were requested to discuss the type and frequency of golf activities in which they had undertaken. For example, when participants discussed how they had engaged within a particular activity (e.g., competitive 18 hole practice rounds), they were instructed to estimate how long this had lasted for in minutes and the amounts of physical and mental effort exerted and fun encountered based on the same ratings scale used in the self-report diary logs. To facilitate naturalness and establish rapport (Shuy, 2002), interviews took place at a location of the participants choice which in all cases was the institutions golf academy and lasted between 35 and 40 minutes. Backward recall was adopted in this interview protocol which required all participants to start estimating the amounts and intensities of golf activities undertaken from the most recent data collection period (e.g., June 2010) and move backwards in time to the start date of the study (e.g., October 2009). Prompts and probes were also purposely used throughout all interviews to help aid the accuracy of recalled data (e.g., why did you appear to undertake fewer competitions in this month). Once all interviews were complete, every participant provided their golf handicap for each month between October 2009 and June 2010 (see table 3.1).

Data Analysis

Self-Report Diary Logs

Stage one of the data analysis process commenced by determining the sports participation histories and annual golf handicap trends for all participants since childhood. The next step involved undertaking a descriptive analysis of each participants diary log data to reveal the types and amounts of golf activities undertaken and mean ratings of physical and mental effort and fun experienced throughout each month of the study. Firstly, all golf activities were placed into one of ten separate golf performance categories and the time in minutes spent by participants in each activity was calculated. The amount of time spent by each participant in each activity was then tallied and presented as a percentage of the overall amount of time spent undertaking the ten golf activities (see table 3.2). Secondly, mean monthly amounts of time spent undertaking golf activities and ratings for physical and mental effort and fun encountered were determined for each participant. This data was then tallied and divided by nine to produce monthly grand means and standard deviations for time spent undertaking different types of golf activities and each of the three dimensions (see table 3.3).

Retrospective Interviews

This analysis of retrospective interview data comprised two parts. In part one, mean hours of estimated involvement for the sample across all golf activities and physical effort, mental effort and fun encountered throughout this enrichment were calculated for each participant at all four stages of the data collection process then tallied and divided by nine to produce monthly grand means and standard deviations. Descriptive analysis was then undertaken to reveal the percentage differences in actual and recalled data for volumes of training, mental effort, physical effort and fun. In part two, mean diary log

and retrospective interview data were compared statistically using four separate paired samples t-tests to determine if there were any significant differences between data sets. Effect sizes were also calculated to reveal the magnitude of any detected differences.

Results

The results of the present study are organised into two parts. Part one presents biographic participant information which was collated prior to the study commencing and illustrates the sports participation histories and golf handicap progressions of all participants since early childhood. This is followed by a descriptive analysis of the types, volumes and intensities of golf activities encountered over the nine month study. Part two employs statistical analysis procedures to determine the accuracy of retrospective interview data when compared with diary logs over a nine month period.

Part One

Developmental Histories

The mean age when participants first started participating with golf activities was 11 (SD = 1.1). Engagement in regular (e.g., weekly) golf competitions started on average aged 14.1 years (SD = 1.2). Participants did not sample many other sports than golf throughout their childhoods and early teenage years and the mean number of sports undertaken during the sampling (aged six-12), specialising (age 13-15) and investment (age 16+) stages of the DMSP were 1.8 (SD = 1.2), 3.2 (SD = 0.9) and 1.1 (SD = 1) respectively. The annual golf handicaps for each participant since childhood are presented in figure 3.1 which reveals they initially encountered large reductions in

handicap between the ages of 12 and 15 but this rate of improvement appears to have plateaued during the past two years.

Descriptive Analysis of Self-Report Diary Log Data

The data collection period totalled 252 days and golf activities were performed on 189 (75 percent) of those days. The mean number of days when golf related activities were undertaken by each participant was 21 (SD = 2.67) out of a possible 28. Throughout the study, involvement within golf competitions (11,290 minutes) and competitive nine and 18 holes practice rounds (17,265 minutes) accounted for 62 percent of all activities undertaken by the nine participants. Lesser amounts of time were spent undertaking shot specific practice activities including long game (6955 minutes) chipping (3855 minutes) and putting (3990 minutes) which accounted for 30 percent of all activities

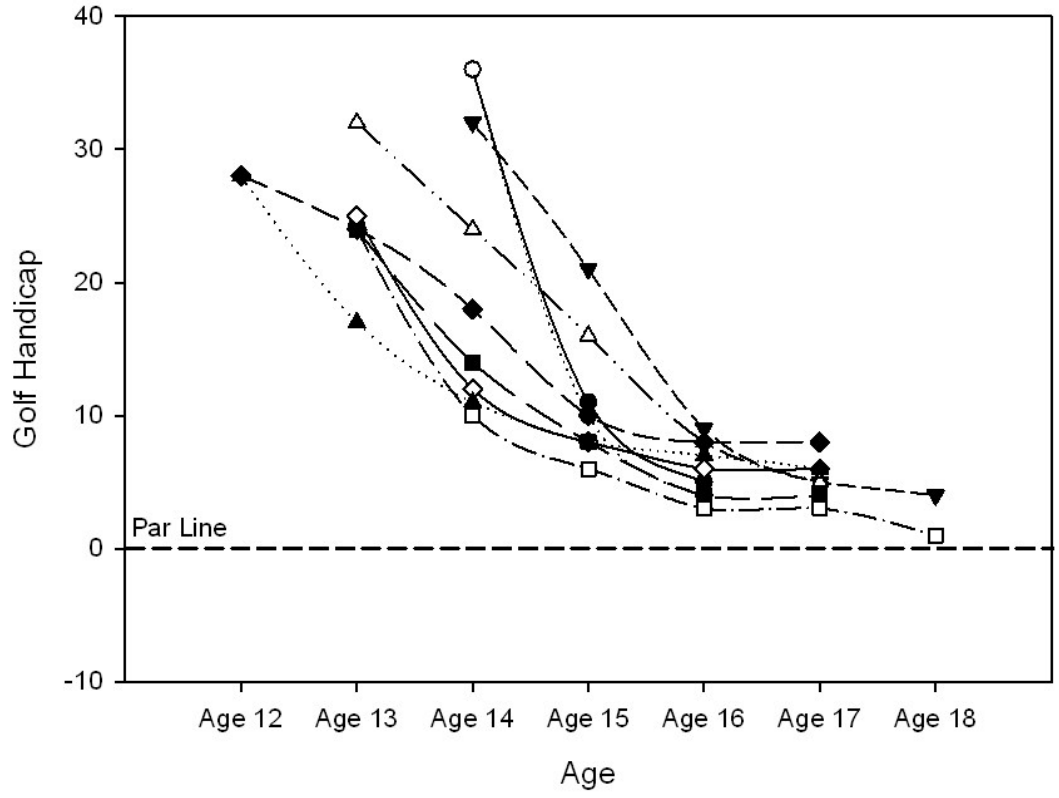

Figure 3.1 Annual Golf Handicap Progression

undertaken during the study. All nine participants spent time practicing their chipping (M = 428 minutes, SD = 148.1), long game (M = 773 minutes, SD = 417.9) putting (M = 443 minutes, SD = 118.7) and undertaking 18 hole competitions (M = 1,324 minutes, SD = 621.5) and nine or 18 hole practice rounds (M = 1,907 minutes, SD = 798.2). Five participants spent time undertaking formal golf lessons (M = 99 minutes, SD = 39.1) and six participants undertook weight and core stability training (M = 246 minutes, SD = 161.8). Two participants undertook mental skills training (imagery and self-talk; M = 100 minutes, SD = 14.1) which were categorised as "off course training" and "other" in table 3.2. Seven participants undertook pitching (M = 150 minutes, SD = 82.6) and five participants undertook shot shaping activities (M = 153 minutes, SD =74.1).

During October 2009, the mean time spent undertaking golf activities was 17.3 hours per week. This increased to 28.6 hours per week in January 2010 and then reduced by approximately five hours per week to 23.2 and 23.6 hours per week during April 2010 and June 2010 respectively. Mean ratings out of ten for physical effort (7.5, SD = 0.24), mental effort (7.7, SD = 0.26) and fun (6.9, SD = 0.36) suggest how the types of golf activities undertaken throughout each separate month showed some resemblance with key tenets of deliberate practice activities. The highest mean ratings for physical effort were obtained in October 2009 and June 2010 and the highest mean rating for both mental effort and fun were obtained in June 2010. In contrast to the handicap plateaus encountered during the previous two years, noteworthy improvements in golf performance were visible throughout the duration of the study. For example, four participants encountered a two shot reduction in golf handicap and a further three participants encountered a one shot reduction. The handicaps of two participants remained the same throughout each of the nine months and although this does not

demonstrate any reductions in handicap, it does reveal a consistency in performance throughout each month of the study.

Justification for Intensity Ratings

Participants were also instructed to provide a brief written justification for each rating they provided in relation to the dimensions of physical and mental effort and fun within their diary loge. Collectively, the data collated suggested how the participants were not always undertaking mentally and physically effortful and demanding practice activities but on occasion they did undertake activities that resembled deliberate practice. For example, the following quote was provided by participant one who allocated a rating of four for physical effort after an 18 hole practice round.

> *"I did not put that much physical effort into my round because it was raining and I was not playing well."*

Participant three provided the following response to explain why he allocated a rating of six for physical effort after a 18 hole competition.

> *"I should have packed up and gone home after the first hole as I was just not interested in trying today and more bothered about going out tonight."*

Participant five wrote the following statement to justify his mental effort rating of six after a solitary short game putting practice.

> *"today was ok but I just went through the motions really, nothing special, I was not really up for it."*

The following response by participant seven explains why he provided a rating of six for mental effort throughout a short game putting practice session.

> *"I didn't put much too mental effort into this morning's session because I was just bored with it. I was tired and the putting drills were boring."*

The following quote was provided to explain why a rating of eight for physical effort was provided after an 18 hole practice round with peers.

"this round was a highly physical effort because I was playing against my classmates."

Participant three provided the following quote to justify his rating of eight for mental effort during a golf lesson tailored to work on his swing work.

"I tried very hard mentally with my swing work because I know I'm not where I need to be with it."

Participant one provided the following statement to explain his rating of nine for mental effort when working on his long game at the driving range.

"I thought hard about every shot I hit focussing on keeping my head down, ball flight, spin and where and how I was going to land the ball."

Finally, the following quote was provided by participant four to explain why he provided a rating of eight for fun encountered during a chipping session.

"I had fun chipping today as I knew I was improving"

Part Two

No significant differences ($p > .05$) were found between diary and retrospective reports for training volumes ($t_8 = 0.08$, $p = 0.94$, $d = 0.03$), physical effort ($t_8 = 0.22$, $p = 0.83$, $d = 0.07$), mental effort ($t_8 = 0.81$, $p = 0.44$, $d = 0.31$), and fun ($t_8 = 1.69$, $p = 0.13$, $d = 0.28$). Effect sizes for differences between diary and retrospective data were small ranging from $d = 0.03$ to 0.31. Together, these findings reveal how there was relatively little variation between the retrospective accounts and diary log reports. The relative differences for volumes of training, mental and physical effort and fun reported in diaries and recalled are presented in figure 3.2. Volumes of training recalled by participants were very similar to values reported in diaries. Slight overestimations in training volume of 2.4% and 2.6% for October 2009 and June 2010 and

underestimations of 6.6% and 0.1% for January 2010 and April 2010 respectively were found. These findings reveal golfers were able to accurately recall the number of hours they spent undertaking golf activities during any stage of a nine month period. The maximum overrepresentation of training volume occurred in June 2010 when interviews took place. This finding raises the issue that recall may not be as effective so soon after an event has occurred in comparison to a few months later.

Amounts of mental and physical effort recalled were also comparable with diary data. Overestimations in mental effort of 1.5% and 5.1% for January 2010 and June 2010 and underestimations of 14.6% and 2.8% for October 2009 and April 2010 respectively were recorded. Underestimations in physical effort of 11.5%, 1.5% and 1.5% for October 2009, January 2010 and April 2010 and underestimations of 6.5% for June 2010 were recorded. Actual and recalled levels of fun were also very similar. Overestimations in fun of 1.5%, 6.1% and 6.7% for January 2010, April 2010 and June 2010 and underestimations of 6% for October 2009 respectively were also found.

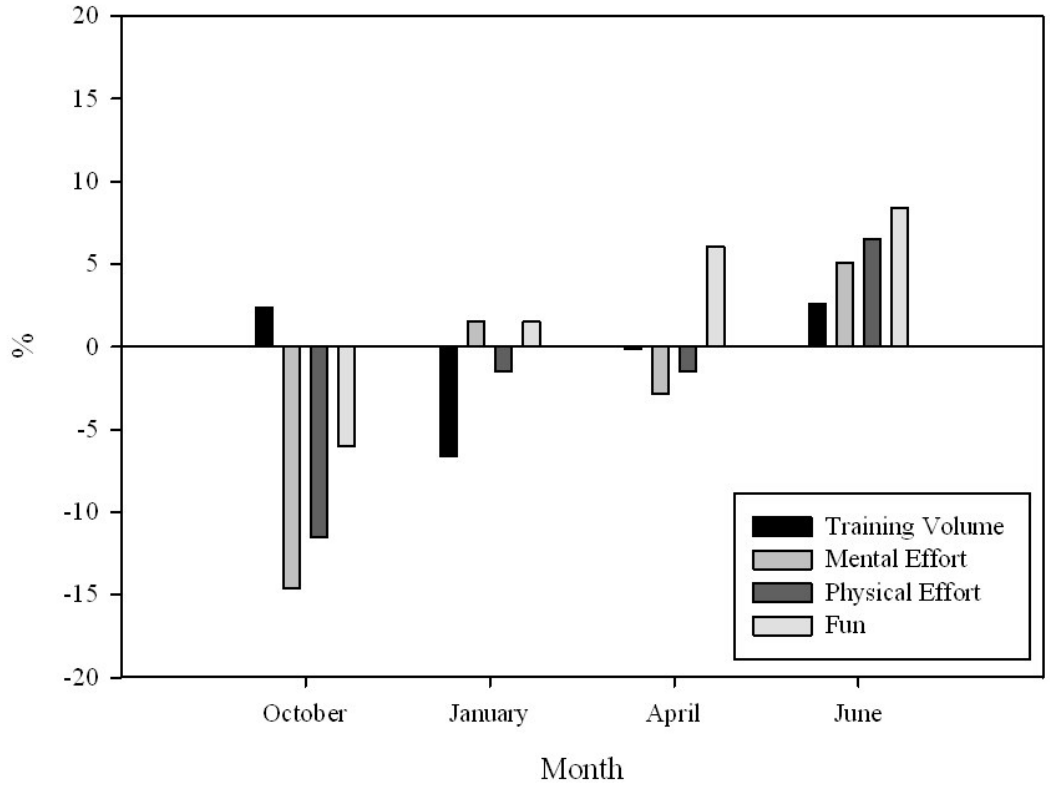

Figure 3.2 Percentage Differences in Actual and Recalled data for Training Volume, Mental and Physical Effort and Fun

Table 3.1

Monthly Golf Handicap between October 2009 and June 2010.

Participant	Oct 2009	Nov 2009	Dec 2009	Jan 2010	Feb 2010	Mar 2010	Apr 2010	May 2010	June 2010
1	5	5	5	5	4	4	4	4	4
2	4	4	4	4	4	4	3	3	3
3	4	4	4	4	4	3	3	3	2
4	5	5	5	5	5	5	5	5	4
5	4	4	4	4	4	4	4	4	4
6	3	3	3	3	3	3	2	1	1
7	8	8	8	7	7	7	6	6	6
8	6	6	6	6	6	5	5	4	4
9	6	6	6	6	6	6	6	6	6

Table 3.2

Time (minutes) Spent undertaking Different Golf Activities.

Participant	1	2	3	4	5	6	7	8	9	Total	Overall %
Chipping	450	535	450	625	330	495	255	170	545	3855	8
Lesson	150		90			45	120		90	495	1
Long Game	705	870	990	60	1120	965	525	1405	315	6955	14
Of Course	30		120	300			500	250	275	1475	3
Pitching			120	300	150	60	75	135	210	1050	2
Putting	600	430	210	510	440	585	430	435	350	3990	8
18hole Comp	480	1970	1020	980	2080	840	780	1790	1980	11290	25
18holePractice	315	1875	3300	1920	2150	2525	1940	1560	1680	17265	37
Shaping		150		210			240	60	105	765	1.6
Other		110	90							200	0.4
Total	2730	5940	6390	4905	6270	5515	4865	5805	5550	47970	100%

Table 3.3

Mean (SD) Monthly Diary Training Volumes (minutes) and Ratings for Physical Effort, Mental Effort and Fun (0-10).

	Oct 2009	Jan 2010	Apr 2010	June 2010	Grand Mean
Training Volume	1040 (235.7)	1713 (602.2)	1532 (470)	1390 (478.2)	1419 (281.5)
Physical	7.7 (.77)	7.2 (1.18)	7.5 (.87)	7.7 (1.34)	7.5 (.24)
Mental	7.7 (.33)	7.3 (1.09)	7.8 (.80)	7.9 (1.01)	7.7 (.26)
Fun	6.7 (.92)	6.9 (1.3)	6.6 (1.12)	7.4 (1.87)	6.9 (.36)

Table 3.4

Mean (SD) Diary Log and Retrospective Accounts (minutes) of Training Volumes, Mental Effort, Physical Effort and Fun (0-10).

Data Collection Period	Diary Training Volume	Interview Training Volume	Diary Physical	Interview Physical	Diary Mental	Interview Mental	Diary Fun	Interview Fun
Oct 2009	1040 (235.7)	1065 (310.4)	7.7 (.77)	6.9 (.84)	7.7 (.33)	6.6 (.79)	6.7 (.92)	6.6 (1.04)
Jan 2010	1713 (602.2)	1608 (333.2)	7.2 (1.18)	7.1 (.98)	7.3 (1.09)	7.3 (.88)	6.9 (1.31)	6.8 (.79)
April 2010	1532 (470)	1529 (425.3)	7.5 (.87)	7.4 (.95)	7.8 (.80)	7.6 (1.03)	6.6 (1.12)	7 (.88)
June 2010	1390 (478.2)	1560 (384.5)	7.7 (1.34)	8.2 (1.11)	7.9 (1.01)	8.3 (.94)	7.4 (1.87)	7.9 (.92)
Grand Mean	1419 (285.1)	1441 (252.4)	7.5 (.24)	7.4 (.57)	7.7 (.26)	7.5 (.43)	6.9 (.36)	7.1 (.57)

Discussion

The primary purpose of study one was to determine the types, amounts, durations and intensities of all golf activities undertaken by nine male aspiring elite adolescent golfers throughout a nine month period. The secondary purpose was to compare actual and retrospective accounts of golf specific activities, physical effort, mental effort and fun undertaken over this timeframe.

The findings of this study revealed several important findings about the day to day golf activities undertaken by the participants. Primarily, the types of activities undertaken were found to be generally beneficial for improving golf performance as evidenced through the reductions in golf handicap which were achieved by seven of the sample (M = 1.2, SD = 0.83). This rate of improvement over a reasonably short period of time is notable considering the stage of learning the participants were situated within and the low mean golf handicap of the sample at the start of the study. Another prominent finding was how these performance improvements occurred off the back of many hours spent playing competitive golf competitions and practice rounds as opposed to golf specific deliberate practice activities per se. These two forms of golf activity which by definition fall outside the conventional notion of "deliberate practice" due to their focus on competition accounted for 62 percent of all the golf provision undertaken by the sample.

Based on the findings presented in this chapter, the study provides partial support for both the theory of deliberate play and theory of deliberate practice in fostering improvements in the performance levels of aspiring elite adolescent golfers. Unlike previous research which has revealed how a long term commitment to solely deliberate practice (e.g., Hodges & Starkes, 1996; Helsen et al., 1998; Law et al., 2007, Ford et al.,

2009) or deliberate play (e.g., Baker et al., 2003; Côté, 1999; Soberlak & Côté; 2003) from an early age through to the late teenage years are conducive for developing sporting excellence, the findings of this study suggest both theories may have had an important role to play in facilitating golf performance improvements for highly skilled yet sub elite adolescent male golfers. When compared with existing literature, the amounts of time (M = 23.7 hours) spent undertaking golf activities were considerably higher than the hours of deliberate practice undertaken each week by international level soccer (13.3 hours) and hockey (8.9 hours) players (Helsen et al., 1998) but very similar to the number of hours per week spent undertaking solitary deliberate practice by national and junior national figure skaters (22.3 hours per week) (Hodges & Starkes, 1996) and figures reported by Ericsson et al. (1993) for world class violinists (21.2 hours). The reasonably high ratings for physical effort, mental effort and fun were also similar to the findings of Hodges and Starkes (1996) and Helsen et al., (1998) in their research with figure skaters, wrestlers, and field hockey players.

In short, it appears how placing high amounts of physical and mental effort into regular golf competitions and practice rounds and engaging with occasional golf specific deliberate practice activities did not stagnate nor hinder ongoing developments in golf performance. Based on ratings and justifications for physical and mental effort, it is important to stress that not all activities undertaken by the participants were always purposeful or taken entirely seriously. This finding may be an important implication for practitioners to consider in the future as it suggests the development of aspiring elite golfers may benefit from regular competition and practice rounds so long as the effort levels resemble deliberate practice. Also, as golf is a self-paced individual sport, it may prove possible for aspiring elites to use golf competitions and competitive practice rounds as an opportunity to practice deliberately although increasing the complexity and

challenge of these activities so participants remain cognitively engaged within every prescribed training session may be challenging to monitor and has yet to be tested.

A secondary purpose of this study was to compare actual and retrospective accounts of golf activity, mental and physical effort and fun undertaken by the participants over a nine month timeframe. The findings reveal how participants were able to accurately recall the number of hours of golf provision they undertook during any stage over a nine month period. Furthermore, there were no significant differences between actual and recalled amounts of physical and mental effort exerted and fun encountered although training volumes (d=0.03) and physical effort (d=0.07) were better recalled than levels of fun (d=0.28) and mental effort (d=0.31).

Determining if actual amounts of time spent undertaking practice equate with retrospective estimates has been identified as a long standing issue because previous talent development studies have typically required participants to recall data from their childhood onwards (e.g., Law et al., 2007). A degree of support for this approach was provided by MacDonald, Horton, Kraemer, Weir, Deakin, and Côté (2009) who found master level athletes could report volumes of time they had spent engaged in physical activity reasonably accurately up to about 25 years after which there was increased variation in data. However, unlike the findings reported in this study, this research only compared the accuracy of training volumes obtained during two retrospective interviews and not actual volumes of physical activity undertaken with retrospective recollections.

Importantly, the findings of this study suggest retrospective recall is only accurate in determining volumes and intensities of golf activities encountered over the course of months and not years. Recollections of the amounts of mental and physical effort

exerted and fun experienced were also similar with diary data although there was a tendency to underreport for the training period furthest away in time (October 2009) and over-report for the most recent training period (June 2010). Grand mean ratings for the three measures also tended to be relatively high throughout the study which may explain why volumes of training were reasonably well remembered.

Limitations

The main limitation with this study was the failure to accurately determine the micro structure of all golf specific practice and participation. For example, participants only provided information referring to the amount of time they spent engaged within golf related practice and competition instead of stating the number of balls struck or successfully putted during each range practice session or chipping exercise. Another limitation of this study was how the duration of time over which participants had to recall the nature of golf provision encountered was relatively short. Therefore, if the method is to gain greater recognition and acceptance within the literature, the need for further longitudinal research which is beyond the scope of a PhD thesis is needed as this would allow for actual and recalled data collected over periods of years and decades instead of months to be compared statistically. A further weakness of the study was the failure to support the diary log data with recollections from the participants coaches who were based at the academic institution throughout the study although these individuals did not operate sufficiently close enough with the participants on a daily basis to gauge precisely the volumes and intensities of all golf activities undertaken as large amounts were undertaken outside of prescribed academic hours without their presence (e.g., during weekends and evenings). Finally, the participants were instructed to recall activities in the retrospective interviews that they had already reflected upon whilst completing their self-report diary log which means they already focused their

attention on these activities previously which might have enhanced recall. Importantly, whilst self-report diary logs have been portrayed as a reliable and valid method for collecting activity data within this study and the sport science and talent development literatures, research from within the physical activity literature suggests more appropriate methods exist (see Prince et al., 2008 for an overview). Additional criticisms of this method include the high burden placed on participants and problems with compliance (Bratteby, Sandhagen, Fan, & Samuelson, 1997; Hopkins, 1991).

Implications and Recommendations for Future Research

The theoretical implications of this study suggest regular involvement within golf competition and competitive practice rounds that are both physically and mentally demanding yet fun to undertake appears appropriate for reducing the golf handicaps of aspiring elite adolescent golfers. However, this developmental pathway appears to only aid performance improvements up to a certain standard (e.g. handicap of approximately 2-4) as evidenced by plateau`s in improvement. Both Ericsson (2003; 2007a) and Côté (1999) would argue that exposure with deliberate practice is now needed to successfully bridge the next step on the journey towards reaching elite levels of adolescent golf performance. The study also revealed how recalled and diary log data were very similar which provides support for using retrospective methods to accurately establish the types of golf activities undertaken over a period of several months. In terms of practical implications, this finding may prove particularly significant for current talent development researchers who may consider using a similar diagnostic tool to determine the micro structure of practice and competition trends undertaken on a monthly or annual basis as aspiring elites progress through their careers. This approach would demonstrate a change in methodological approach as the majority of the extant literature

has relied on one off retrospective snap shots undertaken once elite status has been achieved (e.g., Baker et al., 2003)

It must also be addressed that although other methods to obtain training information longitudinally were available (e.g., observations, video analysis), self-report diary logs were identified by the researcher as the most suitable to address the aims of the study based on time and cost effectiveness. In order to further improve the accuracy of information reflecting the developments undertaken by aspiring sports performers as they unfold over multiple years, future research is encouraged to make use of available technologies such as global positioning system tracking devices to track the impact of deliberate practice regimes upon sports performance.

Conclusions and the Next Step

This study has contributed to the under researched golf development literature base by revealing the types, durations and intensities of golf activities undertaken by nine aspiring elite adolescent golfers over a nine month period. Although seven participants reduced their golf handicap by at least one shot, relatively small amounts of golf specific deliberate practice training and drills were undertaken over the course of the study. Instead, the majority of golf activities undertaken were categorised as golf competitions and competitive practice rounds in which participants experienced reasonably high levels of mental and physical effort and fun. Support for the accuracy of retrospective recall over a nine month period was also provided as recalled and diary log data were found to be highly comparable. Whilst this study has revealed the amounts and types of golfing activities undertaken by aspiring elite golfers on a daily basis, little is known about the participation histories and practice trends of current elite adolescent golfers. Therefore, chapter four describes a study which determined the

types of golf activities that were encountered throughout the careers of eight current elite level adolescent golfers affiliated with English Golf Union (EGU) representative teams, with a particular emphasis on the role that deliberate practice may have played in securing such status.

CHAPTER 4

STUDY 2

THE DEVELOPMENT OF ELITE ADOLESCENT GOLFERS

In taking a unique approach to talent development research, study one used self-report measures to track volume, type and intensity of day to day golf activities undertaken by aspiring elite adolescent golfers over a nine month period. This methodology also enabled the accuracy of retrospective recall to be determined by comparing actual and recalled data. There was evidence in study one of participants undertaking occasional golf specific deliberate practice activities although the majority time was spent playing golf competitions and competitive practice rounds in which mental and physical effort was high. This approach was beneficial in terms of on-going golf performance improvements with four participants reducing their golf handicap by two shots and three participants by one shot over the duration of the study. Retrospective recall was also found to be an accurate method to determine actual amounts and intensities of golf activities undertaken over the course of a nine month timeframe.

Although the applicability of deliberate practice theory in relation to developing golfing excellence had generated lively debate in recent years (e.g., Cobley & Baker, 2010; Crust, 2010; Ericsson, 2001; Ericsson & Hill, 2010; Jenkins, 2010; Paquette & Roy, 2010), no studies presently exist which have examined the biographies, sports participation trends and golf specific practice histories of individuals who have achieved either elite adolescent or senior levels of golfing excellence. One of the few studies to focus on elite golf development was undertaken by Zaichkowesky and Morris (2002)

who retrospectively examined the influence of the family and parental styles upon 20 American professional golfers aged over 50. The findings of this research revealed how all participants started playing golf competitions on a weekly basis by the age of ten and had undertaken daily golf specific deliberate practice activities from the mid teenage years onwards throughout their careers.

Justification for Using Retrospective Interviews

Although concerns over the accuracy of retrospective accounts and its association with recall bias and memory decay are well established in the literature (Bahrick, Hall, Goggin, Bahrick, & Berger, 1994; Brewer, Van Raalte, Linder, & Van Raalte, 1991; Sosniack, 2006; Coolican, 2004; Deakin & Cobley, 2003; Howe et al., 1998; Jones & Harwood, 2008; Kerr & Dacyshyn, 2000; Lauer et al., 2010a, 2010b), a sizeable amount of research which has examined the physical activity and sport participation trends of recreational adult athletes (Friedenreich, Courneya, & Bryant, 1998; Roppenen, Levalahti, Simonmen, Videman, & Battie, 2001) and life-span developmental experiences of elite adult athletes in sport has persisted to utilise this methodology (Bloom, 1985; Carlson, 1988; Donnelly, 1993; Ericsson et al., 1993; Gould et al., 2002; Hill, 1993; Stevenson, 1990; Vernacchia et al., 2000).

However, the growing concerns by many researchers regarding the accuracy of retrospective recall in light of its growing dominance in the literature prompted Côté et al., (2005) to develop a standardised interview procedure which was highly valid and reliable and intended to minimise the recall challenges for current elite and non-elite sports performers in future research. Despite the well documented drawbacks of retrospective recall, Côté et al., (2005) argued how this procedure may obtain accurate biographical and historical data when tailored specifically so participants were able to

recall experiences that were relevant to specific phases of their development. The assumption how sport is a significant component of an aspiring athlete's daily routine led Côté et al., (2005) to focus their interview schedule questions towards gathering information that identified longitudinal patterns (e.g., amounts of training hours and content of practice sessions) rather that specific details of participant involvement (e.g., types of sport undertaken). The interview schedule which is guided by the theoretical frameworks of deliberate practice (Ericsson et al., 1993) and deliberate play (Côté , 1999) was deemed as the most appropriate method to use in this study because it has been used widely throughout the past five years to capture data that showcases the practice histories and sports participation trends of individuals who have achieved elite sporting status and those that did not in cricket (Weissensteiner, Abernethy, Farrow & Muller, 2008), rhythmic dancing (Law, Côté & Ericsson, 2007), tri-athlon (Baker, Côté & Deakin, 2006) and Australian rules football (Berry, Abernethy & Côté, 2008). The fact that all participants in the study were already classified as elite adolescent golfers was another reason why a retrospective instead of longitudinal approach was used.

Although a comprehensive literature which has examined elite performer development across many sports exists, no studies have explored the sports participation histories and practice trends of expert golf performance at either adolescent or senior levels. Therefore, the primary purpose of this study was to quantitatively gain insights into the path travelled by elite adolescent golfers. A particular focus was placed on revealing which theoretical approach with regards to acquiring adolescent golfing excellence, deliberate practice or deliberate play, best described the pathways travelled by elite adolescent golfers who were affiliated with EGU representative teams during the 2009-2010 golf season.

Method

Participants

Participants were eight male adolescent amateur golfers (M age = 18.8, SD = 2.1) with a handicap between +2 and +4 (M handicap = +2.6, SD = 1.3). All participants were affiliated with international representative teams run by the EGU and played golf competitions across a range of standards for county, regional, national and international teams. Within the sample, two participants were England under 18 internationals, four were England Senior A Team Development Squad members and two were current England Senior Men's A Squad members. The competitive playing experience of the sample ranged between six and 12 years. The study had the approval of the local University Ethics Committee and the EGU and all participants provided informed consent prior to participation.

Procedure and Apparatus

Following approval by the EGU to undertake the study, participants from within the various development squads were approached about the possibility of participating in the study via email and telephone. The researcher explained the aims of the study to all consenting participants and the nature of the interview they were to complete by telephone. As part of the process to develop rapport prior to the interviews taking place, participants were offered the choice of interview location in an effort to make them feel as comfortable as possible (Shuy, 2002), which in all cases was their home golf course. In the weeks leading up to the study, the interview schedule was piloted with three non-elite golfers (M handicap = 4.6, SD = 1.84). This process strengthened the interview skills of the researcher and allowed him to become familiarised with the content of the questions to be posed. Based on a retrospective interview procedure

developed by Côté et al., (2005) (see appendix B) participants were then guided through a number of structured questions which aimed to develop a concise longitudinal account of each participants patterns of sport involvement, golf specific practices and psychosocial influences encountered during their golf career to date. The interviews were conducted in a one-on-one format and took approximately 60 minutes (M = 66) to complete. All participants were given the option of a five interval break after approximately 30 minutes. Replicating the approach used in both study one and previous deliberate practice research (e.g., Starkes et al., 1996; Hodges & Starkes, 1996), participants were instructed to start revealing the make-up of their golf careers from the present year backwards. Prior to the data collection process commencing, participants were provided with verbal and written information on the procedure to be followed.

The interview schedule employed was guided by the theoretical framework of deliberate practice (Ericsson et al., 1993) and deliberate play (Côté, 1999) and consisted primarily of closed questions. The data collection process was sectioned into five areas which comprised (1) biographic information, (2) early activity involvement (3) developmental milestones (4) golf specific activities and (5) psychosocial influences. In part one, participants were initially asked to reveal a range of demographic and biographic information including their birth place and date, their parent's occupations and sports participation trends and their annual golf handicap since childhood. In part two, a time line of involvement in all sport and physical activities encountered throughout the participants careers to data was formulated which included the age at which each activity was started and stopped (if relevant) and the age and standard out of ten (*zero very very poo*r and *ten very very good*) of peers they practiced and competed with.

Part three required participants to recall how old they were when they reached significant golf related milestones. This included when they first; participated in golf, undertook golf specific supervised training, played in a golf competition at club, county, regional and international levels and made the decision to try and become an elite level golfer. Part four required participants to estimate the amounts of time they had spent undertaking any form of golf specific activities for each two year period of their golf career to date. Secondly, they had to provide estimates out of ten (*zero resembling very very low* and *ten very very high)* for the mean amounts of physical effort, mental effort exerted, fun encountered in all activities and the quality of training resources they used during each year of their development. Finally, using the same scale as previous sections, all participants rated the psycho-social influences they received during their careers to date from parents, peers and coaches. Overall, this procedure was designed to determine the changing participation, practice and environments encountered by current elite adolescent golfers as they progressed throughout their child and teenage years.

Data Analysis

Corresponding to the five separate components of the interview schedule, the descriptive analysis of data was conducted in five separate parts. Part one of the descriptive analysis determined the mean years of competitive golf participation, family structure, mean number of sports played by parents and siblings, date and place of birth and mean population of geographical location for each participant. The annual golf handicap trends of all participants were also determined. Part two explored the participants sport and physical activity participation histories and performance milestones from childhood to the present day. To illustrate, the age at which participation in each activity started and (if relevant) ended and the age and standard of peers they practiced and competed with in each activity were collated. Part three

revealed the mean ages when participants encountered a series of significant golf specific milestones which included when they initially participated in any form of golf activity and undertook golf specific supervised training for the first time, played their first competitive golf match at club, county, regional and international levels and decided to pursue a career as a professional golfer. In part four, annual amounts of time spent by each participant undertaking golf specific training during each two year of their golf career to date was determined. Subjective annual ratings out of ten for the amounts of physical effort, mental effort exerted and fun encountered were also collated. In part five, key participant motives for playing golf were revealed as well as the range of psycho-social influences provided from parents, peers and coaches using the scale from part four.

Results

Demographic and Biographic Information

Based on parental professions and post codes, participants were classified as coming from middle and upper socio economic backgrounds. Two participants had attended private secondary schools and one participant was home schooled since the age of 13. Each participant had on average one brother or sister (M = 1.1, SD = 1.3) who tended to be older (M age = 27.8, SD = 1.8). Three participants each had an elder sister who were all ex-senior international sport performers (one under 16 ice skater & two senior level international swimmers). The brother of one participant was a current professional golfer playing on a European based professional golf tour. All participants spent the majority of their life to date residing in the same location where they were born which had a mean population of 17,682 inhabitants (range between 3, 015 – 41,364).

Early Activity Involvement

Yearly accounts of the participants sports participation trends revealed the mean number of sports undertaken during the sampling, specialising and investment years were 4.8 (SD =1.4), 4.5 (SD = 1.9) and 1.8 (SD = 0.7) respectively. Participants did not undertake long term golf specific deliberate practice activities from a young age nor display any signs of exceptional golfing ability during childhood or adolescence. Instead, early golf involvement from childhood through to the early teenage years tended to comprise friendly, non-competitive nine and 18 hole competitions against a range of competitors which included fathers, brothers and other club members. In relation to golf, one participant competed for their county at the under 14 age level which increased to four at the under 16 age level. However, at the time of data collection, all eight participants were currently competing for their county senior men's team as well as their respective EGU representative teams on a regular basis.

In addition to golf, the participants also competed in a range of additional individual and team based sports and activities for their primary and secondary schools which included football, hockey, cricket, swimming, track and field (100m – 15000 metre events, javelin, shot putt, high jump), cross country running, basketball, rugby union, badminton and tennis. Selected participants also competed at county under 16 levels in football (N = 3), hockey (N = 2), swimming (N = 2), and cross country running (N = 1). Once all participants had left the secondary education system aged 16 and placed greater emphasis on their golf careers now they had decided to specialise in golf, they still participated recreationally in badminton (N = 3), squash (N = 2) road/cross country running (N = 5) and fishing (N = 3) activities throughout the year.

Developmental Milestones in Golf

Initial participation in golf occurred aged 9.5 years (SD = 2.2) with participation in regular (e.g., weekly) golf competitions starting at 11.1 years (SD 2.2). Participants started to undertake playful golf specific practice on their own or with a parent or coach from 12.8 years (SD = 2.7) which was followed quickly by the decision to try and become an elite adolescent golfer (M age = 13.0 years; SD = 3.4). From approximately 15 years of age (SD = 2.2) participants spent most of their leisure time undertaking golf related practice and from roughly 16 years of age (SD = 2.2) they started to undertake regular golf specific off course training practices such as stretching and aerobic fitness.

Golf Specific Activities

Figure 4.1 shows the performance development of the participants expressed as their annual handicap since early childhood to the present. Annual golf handicap scores revealed the performance levels of participants improved gradually year on year after a progression plateau after approximately four years. Table 4.1 provides an overview of total career hours spent undertaking golf related activities for all the participants in the study. Figure 4.2 demonstrates the development of training resources, physical effort, mental effort and fun experienced during the participant's golf careers to date out of ten with *zero resembling very very low* and *ten very very high*. Figure 4.3 highlights how the amounts of time spent undertaking golf specific activities increased annually in a non-linear fashion. Larger step wise increments were encountered from about 16 years

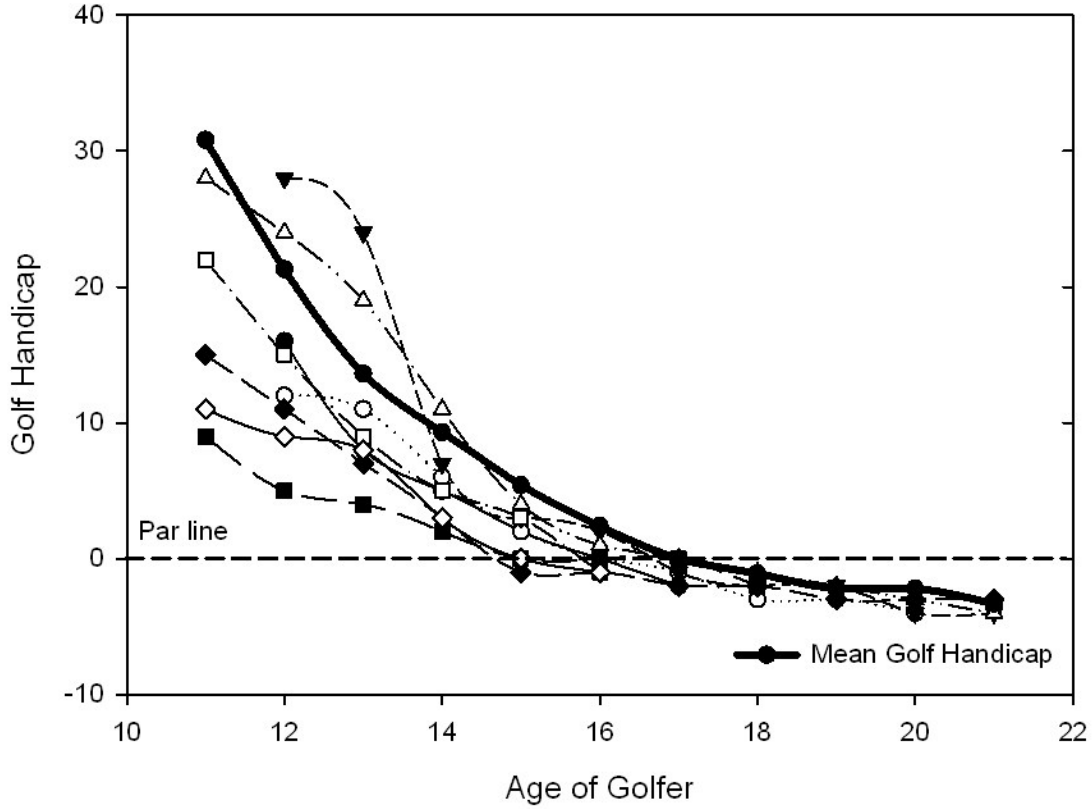

Figure 4.1 Annual Participant Golf Handicap Progression

of age as this was a time when they started to engage with golf specific deliberate practice activities for the first time and had more time to devote to taxing training programmes as they had completed their formal secondary education.

Psychosocial Influences

For all participants, a key motive to take up golf was their father and whilst they (father) played a range of sports recreationally throughout their lives, they were all single figure handicap golfers at the time of data collection (M = 7.4, SD = 1.8). Fathers also undertook a combined advisory and mentoring role from early childhood that increased in capacity until initial selection for county squads and exposure to qualified coaches aged approximately 14-16. During all stages of development, participants were reliant on both parents for pastoral and financial support. Once the participants had established

themselves within the EGU set up, interaction with school friends and associates external to golf reduced and they started practicing and socialising much more with fellow elite adolescent and senior level golfers who were generally older EGU squad members and professional golfers.

Table 4.1

Hours Spent Undertaking Golf Provision throughout Career to Date.

Participant	Years Competing in Golf (age in brackets)	Total Hours Golf Participation	Mean Hours Golf per Year	Mean Hours Golf per Week
1	8 (11-18)	5,032	629	12
2	11 (10-20)	12,016	1,092	21
3	10 (12-21)	10,588	1,059	20
4	11 (11-21)	6,224	566	11
5	12 (7-18)	4,460	372	7
6	8 (9-16)	8,466	1,058	20
7	13 (9-21)	10,572	813	16
8	8 (9-16)	5,004	626	12
Mean	10.1	7,797.5	776.3	14.9
SD	2	2993.6	270.9	5.1

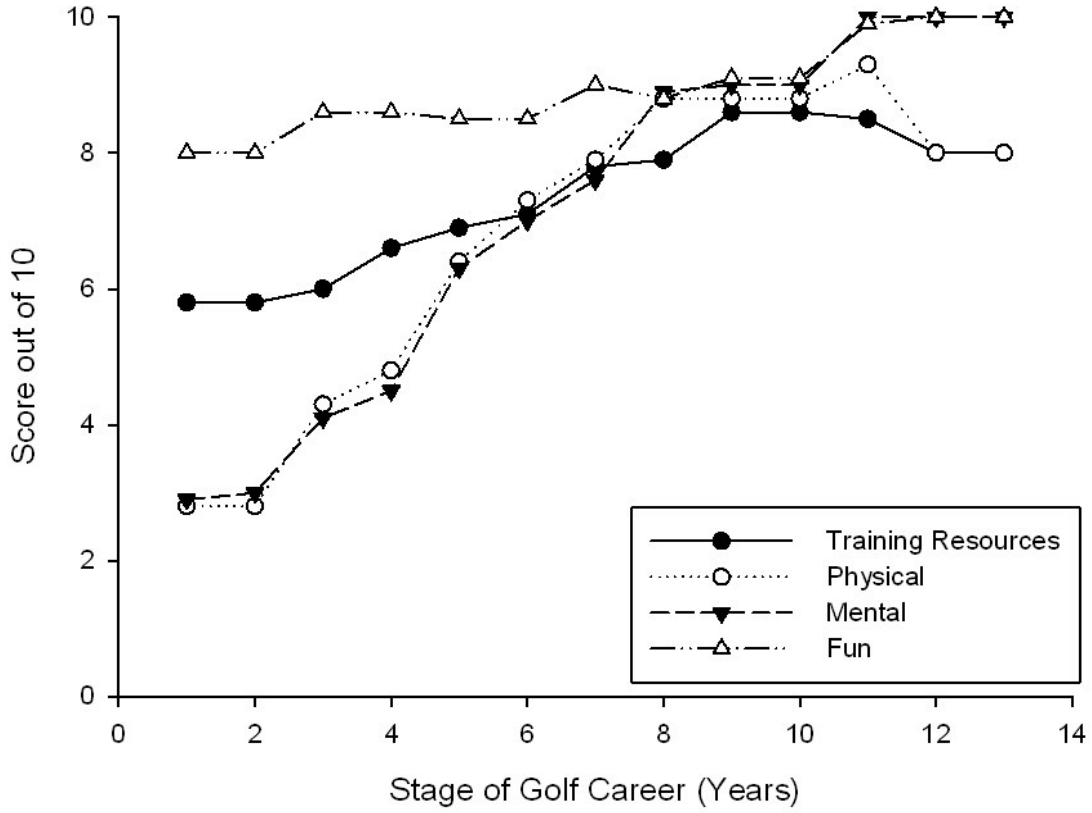

Figure 4.2 Mean Annual Ratings (0-10) for Training Resources, Physical Effort, Mental Effort and Fun Experienced during the Participants Golf Careers to Date

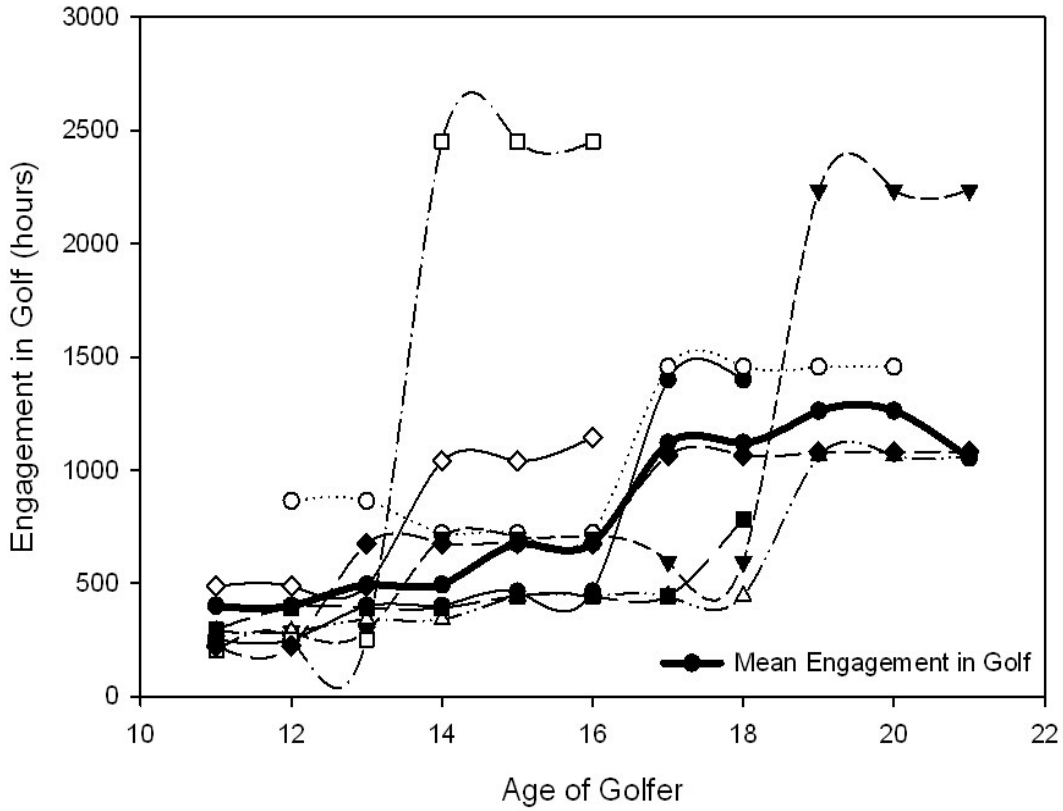

Figure 4.3 Annual Volumes of Golf Provision Undertaken

Discussion

The primary purpose of study two was to examine the sports participation and practice trends of current elite adolescent golfers affiliated with EGU representative squads as no research had previously examined factors which may contribute positively towards the development of adolescent excellence in golf. A reputable finding within the talent development literature is the annual increases in training volumes of those individuals who successfully achieve excellence. On average, the participants in this study reported spending five hours per week undertaking golf related activities for the first two years of their golf careers. After eight years, this figure had increased significantly and ranged

between 25 and 30 hours per week which is higher than the amounts reported by Hodges and Starkes (1996) and Helsen et al., (1998) in their research with figure skaters and field hockey and soccer players. Once the decision to specialise in golf was made, other aspects of the participants daily lives including involvement in other sports and time spent socialising with school friends were sacrificed to cater for the demands of extended golf specific deliberate practice (e.g., time and effort levels).

The results of this study also revealed how engagement with ten years golf specific deliberate practice was not a pre-requisite for acquiring adolescent golfing excellence. Instead, the developments encountered were more reminiscent of deliberate play theory as all participants encountered several team and individual sporting activities during their up-bring, including golf, within a fun, non-competitive learning environment that encouraged limited physical and mental effort levels. Importantly, this diversified approach to development was appropriate for maintaining on-going improvements in golf performance (as referenced by annual golf handicap scores) during childhood and the early teenage years. Participants continued to travel this developmental pathway until selection for county and/or international representative golf squads occurred aged approximately 16 when a commitment to deliberate practice was made for the first time. These findings support previous research which has revealed how senior level sports performance was preceded by a period where a range of sports were sampled in an unstructured, fun spontaneous and unsupervised learning environment and then a commitment to sport specific deliberate practice aged approximately 16 (e.g., Côté, 1999, Soberlack & Côté, 2003). The study also revealed how no participant displayed any prominent signs of potential as childhood golfers which support`s the research by Vaeyens et al., (2009) who argued how exceptional sporting abilities at a young age are not a necessary precondition or accurate predictor for later success in sport.

A notable finding to emerge from this study was how ten years of experience with a range of golf activities including regular competitions and playful practice instead of ten years specialised deliberate practice appears appropriate for achieving adolescent golfing excellence. This finding is comparable with existing research in that although participants had experience of playing their primary sport (golf) for between eight and ten years, the majority of this time was spent undertaking playful practice activities and competitions. For example, Baker et al. (2003) revealed how a selection of male and female Australian netball, basketball and field hockey athletes achieved national selection after only 4,000 hours of sport-specific practice over a 13 year time period and one participant who encountered 14 different sports throughout their childhood and adolescence achieved selection for the senior national netball squad after undertaking only 600 hours of netball specific activities over a six year period. The study by Bullock et al., (2009) also demonstrated how a female Australian with a background in surfing and no previous experience within the skeleton event achieved 13th place at the Torino 2006 winter Olympic Games after undertaking only a 14 month period of skeleton specific deliberate practice. In further support for the findings of this study, Baker et al., (2005) examining the developments of elite tri-athlete performance and found senior level elite tri-athletes only specialised in swimming, cycling and running between the ages of 16 to 20 years after extensive early engagement in various sports during their childhood and early adolescence which included soccer and basketball.

All participants in the study were from middle or upper socio economic backgrounds which mirrors existing research that highlights how children from higher income backgrounds tend to participate within more sporting activities and receive additional support to do so from family members in comparison with children from lower income families (Lin-Yang, Telama, & Laakso, 1996; Van Deventer, 2000; Zeijl et al., 2000).

The findings of this study are also similar to the findings of Bloom (1985) and Côté (1999) who revealed how internationally recognised sports performers experienced significant pastoral support and were normally introduced to their sport by their parents. The findings are also very similar to those revealed by Zaichkowesky and Morris (2002) who found elite touring American professional golfers started undertaking regular golf competitions from approximately ten years of age and specific deliberate practice from the mid teenage years onwards.

An emerging argument within the talent development literature is the suggestion that being raised away from a major city centres is beneficial for the development of expert sports performers (see Horton, 2012 for an overview). Based on the findings of research conducted in North America, it appears that the size of the city where sports performers gain their formative experience may have a considerable influence on how they are initially exposed to sports, their long term participation, and on-going athletic development For example, Côté et al., (2006) examined the population size of where elite American footballers, baseball players and golfers performers resided during their childhood and adolescent years and found living in a city with a population of less than 500,000 inhabitants significantly increased the possibility of achieving expert status in later life. Although the participants in this study are currently classified as elite adolescent and not elite senior level golfers, they have all lived in the same locality and in close proximity to a golf course for all of their lives to date which was located in relatively sparsely populated rural areas of less than 45,000 inhabitants.

In agreement with Abbott and Collins (2004) and Toms (2005), there were differences between the ages of participants when they experienced key milestones on their way to adolescent golfing excellence (e.g., initial selection for county and international

representative squads). These non-linear developments oppose the assumptions of talent development models such as Long Term Athlete Development (Balyi, 2001) and the assertion that the pathway to excellence is a linear, static process. To emphasise, there were clear variations between the types of sports participants had encountered throughout their lives to date. Equally, there were also differences in the amounts of time participants spent undertaking early sports activity involvements during their sporting careers to date. Reinforcing the suggestions made by Ollis et al., (2006), and Philips et al., (2010a), another important finding to emerge from this study was how the mean total hours spent participating in golf activities for each year of the participants golf career was highly variable and ranged between 7.1 to 20.4 hours per week. This implies how factors additional to the total hours of golf specific practice may influence the attainment of adolescent golfing excellence. Additionally, the amounts and types of sports encountered by the participants were diverse with selected participants competing within a variety of team and individual sporting activities across a range of standards from school to county levels up to 16 years of age which included football, hockey and swimming.

A recurrent finding within the sports participation literature is the notion how the development of sporting excellence requires long-term social support from various sources (Côté, 1999; Durand-Bush & Salmela, 2002; Gould et al., 2002; Keegan et al., 2010; Vernacchia et al., 2000). In congruence with these studies, the roles undertaken by parents and in particular fathers who were found to have provided considerable financial, emotional and practical support for their siblings from childhood to the present day were evident. The critical roles that coaches have to play in youth sport development systems are well acknowledged (Côté & Sedgwick, 2003; Côté & Fraser-Thomas, 2007; Côté, Young, North, & Duffy, 2007; Macphail & Kirk, 2006; Wiersma,

2000, Zaichkowsky & Haberl, 1999) yet a somewhat unexpected finding of this study was how no participants had received any form of regular professional golf coaching until selection for county representative teams aged between 14 and 16 years of age. The emergence of the coaching and mentor roles undertaken by fathers throughout their child's golf career until selection for EGU squads also expands on previous research that has examined the role of family members in long-term athlete development and highlights the reliance the participants placed upon their fathers within the context of their golf development (Holt et al., 2008; Horn & Horn, 2007; Kay, 2000; Wolfenden & Holt, 2005).

The notion how participants have not yet achieved excellence status because they were only competing at elite adolescent and not elite senior levels must also be stressed. Considering the nature of daily golf activities up to selection for EGU squads and mean age once commitment to deliberate practice was made (approximately 16 years), it seems logical that several more years of undertaking daily deliberate practice may be required to display the hallmarks of elite senior status, at which time participants would be aged between 26 and 30 years. If this rate of development was found to be the case, it would suggest participants had undertaken approximately ten years of golf specific deliberate practice and lend support to the theory in terms of the developing senior level golfing excellence.

Limitations

Although the precision of retrospective recall over a nine month period was demonstrated in study one, a cautionary note concerning the accuracy of the data collection method employed in this study must be acknowledged because participants were recalling events which occurred more than ten years ago in some cases. The

failure to validate recalled data with coaches, peers, parents, historical archives and the developments encountered by current elite senior level golfers who compete on international standard golf circuits (e.g., European golf tour) were further criticisms of the study. Another drawback of the study was the failure to move beyond collecting estimated amounts of golf specific deliberate practice undertaken and to focus more specifically on distinguishing the precise micro structure of activities undertaken by the participants during their careers to date.

Implications and Recommendations for Future Research

The main theoretical implication that coaches, sport psychologists, parents and policy makers can draw from this study is how early specialization and long term deliberate practice from an early age may not be a necessary requirement for the attainment of adolescent golfing excellence. The findings of the study lend support to the theories of early diversification and deliberate play (Côté, 1999; Baker et al., 2003) in relation to developing adolescent golfing excellence but also acknowledge the important role that deliberate practice seems to play from the age of roughly 16 in acting as a key catalyst in driving golf performance improvement and in aiding the transition from elite adolescent to senior level golf competitor. Instead of relying on retrospective recall, future talent development research may also wish to make use of global positioning systems technology which would allow researchers to longitudinally track the day to day activities of both aspiring and current elite adolescent golfer over extended periods of time (years) for the first time. Future research is encouraged to determine whether the microstructure of golf activities undertaken by aspiring elite golfers over extended periods of time more closely resemble deliberate practice or deliberate play activities. In doing so, future talent development research may wish to make use of global positioning systems technology instead of persisting with retrospective recall methods.

This approach may enable researchers to longitudinally track the precise make-up and intensities of the day to day activities undertaken by both aspiring and current elite adolescent golfers as they seek to ensure a successful transition into the ranks of elite senior level golf performance.

This approach, although time demanding and expensive may provide valuable information for researchers and policy makers in their efforts to distinguish if there are any physical and psychological factors that consistently discriminate between elite and non-elite sports performer populations. Future research may also revisit the participants from this study on a yearly basis for the next decade and replicate the approach employed in study one by using retrospective recall to determine the micro structure of practice activities undertaken.

Conclusions and the Next Step

In conclusion, the evidence in this study suggests long term deliberate practice is not a pre-requisite for the attainment of excellence as an adolescent golfer. Participants achieved elite adolescent status in golf after undertaking approximately 8,000 hours of golf activities which comprised playful activities, regular competition and occasional golf specific deliberate practice sessions as opposed to a specific ten year acquisition period of solitary golf specific deliberate practice. Based on subjective ratings of physical and mental effort exerted, the findings of the study clearly demonstrate how the participants made a long-term commitment to deliberate practice from approximately 16 years of age which appears critical for on-going reductions in annual golf handicap figures as participants enter the early adulthood years.

High level adolescent golf performance appears to arise through the interaction of developmental, familial and contextual factors as opposed solely to high volumes of specialised golf training from an early age. These findings are comparable with recent research undertaken by Côté and colleagues which recommends aspiring elite level sports performers would benefit initially from experiencing multiple sports within a participation focused, fun, task orientated, learning environment that facilitates the refinement of motor skills prior to undertaking deliberate practice from late adolescence onwards (Baker et al., 2005; Soberlack & Côté, 2003). Interestingly, no participant demonstrated any clear indications of golf supremacy until the late teenage years which not only suggests superior golfing skills and accomplishments as a youngster are not necessary requirements for success in later life but also questions the value of early specialisation pathways.

Historically, sport specific talent development researchers have relied heavily upon multi method quantitative methodologies to examine the developments and practice trends of elite and non-elite sports performers (Baker et al., 2005; Helsen et al., 2000, Hodges & Starkes, 1996; Ward et al., 2007). In recent years however, a growing movement advocating the benefits of undertaking qualitatively focussed talent development research has resulted in the emergence of multi-method qualitatively focused studies within the expertise literature (e.g., Johnson et al., 2008). Whilst these multi-method approaches to data collection may provide insights into the experiences and practice trends encountered by elite and non-elite athletes throughout their developments, employing mixed methodologies which integrate both quantitative and qualitative paradigms may be viewed as a more appropriate way of capturing the development of sporting excellence and providing increasingly comprehensive answers and deeper understanding to our research aims and objectives. On this basis, it was

decided that a mixed methods approach may provide greater insights into the lived experiences and meanings associated with acquiring adolescent golfing excellence and complement the wider findings of the thesis. Therefore, chapter five seeks to describe a qualitative study which used IPA to build upon the findings of chapter four and determine a truly in-depth account of the lived experience and what it actually means for individuals to successfully travel the path from aspiring to elite adolescent golfer.

CHAPTER 5

STUDY 3

THE LIVED EXPERIENCES OF ELITE ADOLESCENT GOLFERS

The findings of chapter four suggest current elite adolescent golfers did not start to undertake golf specific deliberate practice until they were aged approximately 16 years of age. Instead, they encountered a diversified introduction to several sports, including golf, within a playful, fun, non-competitive, participant focussed environment that closely resembled deliberate play activities. However, a change in emphasis towards their day to day sporting involvements occurred around the age of 16 when exposure with golf specific deliberate practice became increasingly evident once participants had gained selection for county and international representative golf teams.

Justification for using Interpretative Phenomenological Analysis

As the study in chapter four only utilised a quantitative methodology to explore the development of elite adolescent golf performance, the findings may be restricted in terms of the depth of information that was provided as this approach is limited in its ability to provide thorough insights into the meanings participants attribute to their lived experiences of significant events. A method particularly suited to understanding the lived experiences of an individual is Interpretative Phenomenological Analysis (IPA) which has gained popularity over the past decade with clinical and health researchers. The primary aim of IPA is to understand an individual's interpretations and meanings of a particular condition or experience (Smith & Osborn, 2003; Smith, 2011). IPA has become an important investigative technique in numerous domains over the past decade

and whilst popular within applied psychology fields such as health (see Broki & Wearden, 2006 & Smith, 2011 for an overview) the method is also gaining popularity within the applied sport psychology literature (e.g., Arvinen-Barrow, Penny, Hemmings, & Corr, 2009; Russell, 2004; Warriner & Lavallee, 2008).

The research by Nicholls, Holt, and Polman (2005) used IPA to examine instances when 18 international adolescent golfers coped effectively and ineffectively with performance related stressors during competition. This approach was also deemed the most appropriate methodology to use by Lavallee and Robinson (2007) and Warriner and Lavallee (2008) in research which explored the experiences of retirement from international level competition by several retired female gymnasts. IPA was also employed by Cotterill, Sanders, and Collins (2010) who explored the nature of pre-performance routines used by six male international golfers which revealed how the development of routines were dependent on the personality, coping resources, and situational appraisals of each individual performer.

IPA was identified as the most appropriate approach to use in this study because no other method is capable of generating such in-depth, rich and unique information and it goes beyond "scratching the surface" of the individuals experiences. Further justification for its use was provided by Smith, Flowers, and Larkin (2010) who stated when individuals are involved with an experience of something major in their lives, they start to reflect on the significance of what is happening and IPA allows them to engage with these reflections. They also encourage the use of IPA in research which seeks to explore how an individual makes an important life decision, which in the case of the participants in this study, was making the commitment and travelling the path to elite adolescent status in golf.

Therefore, in an attempt to move beyond the findings of chapter four and generate additional knowledge which may contribute to the under researched golf development literature base, the aim of chapter five was to use IPA to determine a truly in-depth and unique account of the lived experience and what it actually means for individuals to successfully travel the path from aspiring to elite adolescent golfer.

Method

Participants

Equivalent to chapter four, study two.

Procedure and Apparatus

Following approval by the EGU to undertake the study, participants affiliated with EGU Under 16 and 21 development squads and Senior Men's A team squads were approached via email and telephone about participating in the study. Consenting participants were informed how they would be asked questions upon the nature of their golf development to date and the interview duration would be dependent on how much they had to say. All participants were offered the choice of interview location in an effort to make them feel as comfortable as possible (Shuy, 2002), which in all cases was their home golf course. Prior to interviews (see appendix C for schedule of questions), participants were provided with verbal and written information which provided further clarity upon the interview process that was to be followed. In the month prior to the study commencing, the proposed interview schedule was piloted with six non-elite golfers (M handicap = 2.7, SD = 1.3) which highlighted the need to simplify the

wording of particular questions and further strengthened the interview skills of the researcher.

It is essential when undertaking IPA research that the interviewer builds a rapport of trust with the interviewee. As the researcher was also an ex-elite adolescent athlete himself, he possessed contextual knowledge regarding the demands and terminology used in elite sport which he used to aid the process of establishing a bond with the participants (Eklund, 1993). To make the participants feel at ease, each interview started with an informal discussion which revolved around how they first became involved in golf (Rapley, 2004). Following this rapport building exercise, data capturing how the participants viewed their world as elite adolescent golfers was then collected using a predetermined semi-structured interview format which was supplemented by probes to elicit more detailed responses when necessary (Smith & Osborn, 2003). This format allowed the direction of the interview to be guided by the participant rather than dictated by the schedule (e.g., Borkoles, et al., 2008; Nicholls et al., 2005), made it possible to follow up on relevant issues brought up in conversation and ask participant specific probes depending on the nature of responses (Patton, 2002). The interview questions were centred on four key areas which included (1) participation in golf, (2) the meaning of golf, (3) golf environment and (4) social support. The schedule was intended to ease the participants into the interview and began with the question "reflecting back over your childhood and adolescence, can you tell me in as much detail as possible how you first became involved in golf?"

Example of probes used during the interviews included "please provide more detail", "why did you think that", "how did that make you feel" and "how did that influence your decision". Every attempt was made to follow the participants and understand their

unique stories rather than following a standardized list of questions (Smith & Osborn, 2003). Five minute breaks was integrated into all interview schedules after approximately 40 minutes to maintain participant enthusiasm and focus in the latter stages of the data collection process. Interviews lasted approximately 70 minutes (M = 72) and were terminated once the researcher was satisfied theoretical saturation to all questions posed was achieved.

Data Analysis

Date were transcribed verbatim and subjected to IPA (Smith & Osborne, 2003) by the researcher. Each transcript was read several times and notes placed in the margins to reflect interesting or significant comments and meanings in relation to the development of elite adolescent golf performance. The thoughts and interpretations of the researcher towards the data were also annotated on the transcripts. As this process advanced, sections of text were categorised and initial theme titles reflecting the experiences of the participants were created. Researcher notes were then transformed into emergent themes by making associations between actual participant statements and researcher interpretations (Smith & Osborne, 2003). A catalogue of emergent themes reflecting the richness of the participant's experiences and responses was formulated once all eight transcripts were subjected to IPA.

Connections between themes based on similarities were made resulting in a pool of sub-ordinate and super-ordinate themes being established (see appendix C). Once these categories of themes were finalized, extracts from the interviews which represented each theme were selected. The final stage of data analysis process involved developing a written account from these themes which is an important part of the analytic process (Smith & Osborn, 2003). This account was then reviewed and rewritten several times

over an eight week period by the researcher. At this stage, all participants were contacted via phone to discuss the accuracy of the researcher's data interpretations. This involved the participants answering a sample of verification and clarification questions in a member checking procedure which aimed to provide further depth to the data that was already created (Lincoln & Guba, 1985). All participants were sent a brief overview of their own personal development through email and contacted by the researcher via telephone seven days later to undertake a short discussion (roughly 15 minutes) about the accuracy of the researcher's findings. This process also enabled the researcher to pose a series of questions to verify that the participants had indeed discussed their experiences of travelling the path to adolescent golfing excellence throughout the interview.

As our experiences as individuals may affect our interpretations and intentions (Yardley, 2000), the researcher maintained a reflexive journal before and during the data collection and analysis stages which represented his thought processes, reasoning and actions throughout the duration of the study. The intention of this self-reflective procedure was to minimize researcher bias with respect to imposing personal views onto participants accounts and interpreting their words within the context of the researchers own sporting experiences (Smith & Osborn, 2003; Shaw, 2010). The journal contained reflections about the researchers own sporting developments and experiences encountered during his football and athletics careers. The researcher also engaged in regular peer debriefing conversations throughout the duration of the study with his director of studies who played the role of the critical friend (Holt & Sparkes, 2001).

Results

The results of the data analysis yielded 21 sub-ordinate themes that were subsequently grouped into the following four super-ordinate themes: Social Influences, The Pathway Travelled, Strategic Approach to Developing Excellence and Role of Psychology in Developing Excellence. The four super-ordinate themes are summarised in table 5.1 along with supplementary quotes.

Social Influences

The Importance of Fathers in Developing Excellence

All participants were tremendously grateful and appreciative for the wide ranging pastoral and financial support provided by their parents throughout their golf careers to date. Participant one described their parents as "*just brilliant people who want the best for their all kids*" and participant five stated how his father "*has never let him down*" throughout his golf career to date. Fathers, who in all cases were the primary motive for initial involvement in golf, helped to fuel their son's long term motivation to compete in golf by providing constant encouragement and guidance during the early stages of their sons golfing careers. It was striking how participants had a limited interest and passion for the game of golf until their fathers intervening. Five participants revealed how they were happy and motivated to play golf from a young age with participant four stating how he was "*happy at trying to make it as an elite golfer because that is what my dad would like and he would be proud of me."*

Emergent Role of Mothers in Development

Participants also started to appreciate and value the influence that their mothers had to offer in terms of their development as a golfer once they had achieved international recognition for the first time. For example, participant six stated how "*mum being*

involved was just the right thing at the right time for my golf". The emergent motherly influence was highlighted by their growing contributions in relation to organising the day to day planning of future travel and accommodation arrangements for competitions within the United Kingdom and overseas.

The majority of the participants felt "*assured*" and "*comfortable*" with how their mothers had started to cast a vented interest and placed an increased input into the day to day management and organisational demands of their careers post 16. For participant two, this enabled him to "*spend more time practicing and getting ready and planning for competitions".* The following quote emphasises how participant one valued the role undertaken by his mother during the past two years of his career.

> *"my dad has always been there with me at every step, even on the putting greens playing about as a kid, but I really think my mum has been brilliant in getting involved and she makes things easier for me and I just focus now on the golf which is great."*

Participants were always receptive to the thoughts and opinions of their parents in relation to their golf development. The extract below emphasises how participant four has always taken on board his father's critical appraisals.

> *"he (dad) comes to watch and analyses where I need to make improvements and tell me what was good and then we will debrief on the way home and it is something we have a great father and son bond."*

Participants were highly appreciative of the sacrifices made by their parents throughout their careers, especially since they secured international selection. These sacrifices comprised taking time off from work to attend competitions, selected training sessions and undertaking the role of caddy. Participant five discussed how he considered his father had "*been the best mentor and dad I could ever have wanted*" throughout his golf career which he found extremely

Table 5.1

Master Table of Super-ordinate and Sub-ordinate Themes and Exemplar Quotes.

Super-ordinate Themes	Sub-ordinate Themes	Exemplar Quote
Social Influences	4	*"I would just go to the range with my dad and he was really supportive and acted like a mentor as he has played golf to a decent standard (ten handicap) and won competitions at the club but now he doesn't play as much but he always encouraged me and told me to enjoy it."* (P1)
The Pathway Travelled	9	*"well it was all weekends and every summer night we would go out and just played really because at that age I did not do much practice it was much more like just go and play 36 holes every day really, it was just pure playing and I probably did not practice like I do now and I would say I only started practicing really when I got to plus handicap so I purely just played golf."* (P3)
Strategic Approach to Developing Excellence	4	*"I try to make as many connections as I can because you never know who may be able to help you out and where and it could be the local person at the golf club who plays once per week but gives you that valuable piece of information that could help you in the future you just do not know."* (P8)
Role of Psychology in Developing Excellence	4	*"I just picked the game up very quickly and if you pick something up quickly you just want to get better and every day I went out there I was just improving and hitting the ball better and it was a great buzz to see myself improve and everyone tell me so when I was younger."* (P7)

rewarding as it helped to develop the son and father relationship between them both. This "mentoring" role was experienced by five of the participants and continued until they gained selection for county and international squads. It was at this stage in the participants careers where their fathers took an increasingly distant and peripheral role in their development as they now had the opportunity to liaise with well qualified golf coaches affiliated with the county and EGU squads on a regular basis. Even after the introduction of this specialised programme of coaching enrichment (e.g., deliberate practice) the participants demonstrated how they valued their fathers input and ensured they continued to provide critical appraisals on their competitive performances (and practice if they were present). The following quote by participant one highlights how his father has played a pivotal role throughout every stage of his development as a golfer so far in golf.

> *"I would just go to the range with my dad and he was really supportive and acted like a mentor as he has played golf to a decent standard (ten handicap) and won competitions at the club but now he doesn't play as much but he has always encouraged me and told me to enjoy it."*

Participant two spoke about the assistance his father has provided him throughout his golf career to date and what this meant to him as an aspiring elite golfer.

> *"my father has always been influential but at the start he was just let me get on with it really and he must have seen in his eyes that I was becoming good. He became a bit more involved and pushed me to move on and gave me every opportunity to get better and always did the best thing for me regards providing me with equipment and coaches and if something wasn't right he was as eager as me really to change it for the better. He also paid green fees at the club and made me analyse the things that I was not good at and made me work on these things to become better."*

Peripheral Involvement of Extended Family

Parents played an active, visible role in their son's on-going development. However, this wasn't the case for extended family members including grandparents, cousins, aunts and uncles who started to take an increasingly detached and peripheral interest in the development of the participant golf performances once they became established international level performers. The following quote by participant four emphasises this:

> *"well my gran and auntie who used to be interested in my development when I was at school do not really bother anymore because they used to come and see me play for the county but they say they cannot have time off from work now to come and watch me play as most competitions are down south and we live in the north. I know they still care and I am fine with it and I suppose they just let me get on with it and hope I achieve my goals."*

Family Game Culture

Golf had become central to the lives of the immediate family unit by the time the participants were competing on the international stage. The mother and siblings of five participants had also started to compete in golf competitions and activities at varying standards. Participant eight commented that "*golf was now a way of life in my family, it is who we are and everyone on our road knows us as the golf family*" and participant four concluded how "*golf is the topic of every chat in our house and everyone seems to just have golf on the mind all the time and this goes crazy when I am playing my competitions and especially for England abroad.*"

Participants liked the fact that golf has a family game sub culture which afforded them more opportunities to spend time together whilst practicing and competing. To elaborate, participant six believed how his blossoming golf career had *"brought the family so much more together"*. A main reason why parents were happy to develop a

family game culture was because they perceived golf as relatively safe, non-contact activity in comparison to other sports. As participant three stated.

> "*we all take our golf gear to the club when I play and they go on the range and hit some balls and watch me.*"

In addition to fathers, mothers, brothers and sisters also started to attend all international level golf competitions both based in the United Kingdom and abroad once selection for EGU development squads was confirmed. The following quotes emphasise the emerging family sub culture towards golf that has been created since participants specialised in the sport and made the commitment towards achieving senior levels of golfing excellence.

> *"mum never used to play golf but she started just so she could see more of me and my dad because we were always out at golf so she started playing so she could spend more time with us."* (P3)

Below, participant two acknowledges how his mother has started to play an increasingly important role within his golf career in recent years.

> ***"****since about the age of 17, my mum has become a bit like my manager. She will sit down with me and work out all the expenses, entry fees and complete the entry forms, flights and hotels. She even does the same for my mate who always comes with me when I play competitions so we share the cost out more, so she books all the accommodation."*

The statement by participant eight alludes to the fact how his mother is fully supportive of his decision to try and take the next step into the elite senior ranks of golf performance.

> *"mum just tends to sit quietly and just watch, she gets very uptight and nervous when I play. She almost feels every shot I play but she doesn't really have a great understanding of golf compared with dad but she really*

plays every shot I make and she is very passionate that I do well and achieve the goal that I have set myself."

Developmental Pathway Travelled

Living for Sport

This study also explored the pathway travelled in acquiring adolescent golfing excellence. Participants encountered a wonderfully enjoyable and positive sporting up-bring as young children. Whilst they have always enjoyed playing golf, and engaged with the activity at their own free will, they encountered a diverse sporting experience between the ages of approximately 11 and 14 in which their sporting priorities and interests lay with other activities such as team sports. For example, participant three revealed "*I played any sport I wanted as a kid, things like golf and football and running round the quarry with my dad*" and participant one said *"I pretended I was Michael Owen in my granddads garden just kicking the ball everywhere as a young kid because I initially wanted to be a footballer."*

Although no commitment to specialised golf specific training occurred during childhood, all participants picked the game up quickly during the early teenage years which was important for developing intrinsic motivation and levels of competence. This was well demonstrated by the following quote from participant eight.

"I was just pretty good at all these sports and got into every team at school without actually doing any real practice so I guess I was a bit of a natural and it made me a bit of a star sports man in school and the sports teachers loved me."

Pleasurable Diversified Sporting Up-bring

All participants encountered a diversified introduction to many sports, including golf, since childhood. The early and significant improvements in annual golf performances were fuelled by regular involvement with non-competitive enjoyable golf activities and

competitions with their fathers and elder club members on challenging local courses and facilities. The nature of these experiences tended to be junior golf competitions and fun based developmental training activities that were devised and delivered by members of the coaching staff at their home clubs. The following quote emphasises the love for the game that participant six had as a youngster.

> *"I just loved playing golf as a young kid with all the mates from the club. We would be there all day in the summer holidays and just play so many games all day and bet on who would win and lose at all these putting drills and crazy skills tests we would make using whatever equipment we could get our hands on. They were good days, really happy times."*

Although participants competed occasionally in national junior events during childhood and the early teenage years and found the experience to be both enjoyable and worthwhile, success at these events was limited. As participant three revealed.

> *"I thought I was good until I went to the junior boys and came home on the second day as I missed the cut by miles. It was embarrassing really."*

Participants also considered themselves to be physically late developers in golfing terms and four considered themselves to be weak and slight during their childhood in comparison to their peers. Once participants started to mature physically aged approximately 14 – 15 years, immediate performance improvements as evidenced in handicap reductions occurred and one member of the sample said *"this sudden improvement made me think hang on I could actually be quite good at this game if I want to be."*

From an early age and across all sports, it emerged how participants much preferred competing as opposed to practicing. This was illustrated somewhat by the decision not to engage with any forms of sport specific deliberate practice throughout their childhood and early teen years. Instead, participants persisted to undertake regular competition

across a wide range of sports which is emphasised by participant six who said *"there was nothing better than getting up in the holidays and going down the club with your mates and playing rounds of golf all day."*

In terms of golf activities, participants were content and needed no encouragement to participate in practice rounds and playful fun based activities with their fathers and peers. The following descriptions emphasise the fun based experiences that resembled a deliberate play pathway which was travelled by all of the participants throughout their early adolescent years.

> *"well, in the beginning when I was a junior I would literally just go out and play as much golf as I could, like during the summer holidays I would typically play three rounds every day, I would honestly just play the course between 70-80 times during the summer school holidays, literally as much golf as I could physically get in. I loved it."* (P2)
>
> *"well it was all weekends and every summer night we would go out and just played really because at that age I did not do much practice it was much more like just go and play 36 holes every day really, it was just pure playing and I probably did not practice until well I would go to the driving range but not practice like I do now and I would say I only started practicing really when I got to plus handicap so I purely just played golf."* (P3)
>
> *"I mean as a youngster I tended not to practice much and I just went out and played hole after hole after hole and I mean you could get here at 8 in the morning and wouldn't leave until 9 at night which was 13 hours of playing."* (P4)

Participant Led Development

Throughout their careers to date, participants have always enjoyed taking responsibility for their own development and been keen in becoming increasingly self-regulated

golfers, although participant four found it hard initially to take responsibility for his future development.

> *"I know I was really reliant on my dad as a kid for everything but now I must start to do things for myself because he cannot come and play my shots for me on the course."*

The following quote emphasises how from an early age, participants always took on board the opinions and guidance of parents but ultimately took full accountability over when and where they wanted to compete and practice.

> *"I have always took control more than anything and when I formulated my development plan last year it was pretty much what I wanted to do and obviously I got their (family and coach) opinions and tried to blend them together but I like to and always have liked to manage my own game.*" (P6)

Influence of Environment upon Developmental Opportunities

An environment which provided access to a range of suitable golf related facilities was a contributing factor to why the participants felt encouraged to participate in golf activities. They understood and acknowledged the benefits and added opportunities for development that were provided through spending their entire lives to date living in rural settings with low populations and located in close proximity to high quality underused golf facilities. The following accounts emphasise how the participants really valued these opportunities.

> *"I was brought up in an environment where I could practice golf easily really, we have a large garden which I could practice putting and chipping. Also I live in a little town which has lots of open fields which I could practice on."* (P1)

"I have always lived across the road from the golf course so I just crossed the road jumped a ditch and I would be on the 17th green which was very handy." (P7)

Golf Identified as an Opportunity to Demonstrate Competence

Participants enjoyed the challenge and preferred to compete against elder superior players throughout all stages of their golf development to date. They enjoyed being competitive, thrived in winning any sport and non-sport related task and had an overwhelming desire from a young age to become successful in all walks of life. This was demonstrated nicely by participant seven who stated.

"I just love winning at everything and anything and it makes me feel good just really good about myself. I just love getting better at things all the time."

The sample enjoyed being successful as it enhanced their competence not only as golfers but in day to day life. For example, participant four stated how winning at golf "*was like a drug and you need it all the time as it makes you feel on top of the world*". Participants could see the benefits of losing to elder superior competitors so long as they could rationalise how they had benefited in some way from the experience. To do this they frequently took time and space after a defeat or poor practice session to reflect on the process and determine where and why they failed to win or perform to expectation. The following account highlights why participant eight enjoys competing against older opposition and the benefits he takes from the experience.

"I learn so much more from playing with older people who are better than me. You learn tricks regards either match play or stroke play and you learn so much more about course management, there is so much more to learn from older experienced players. It is nice to play with people your own age

but they only know as much as you do so that is why I love playing with people who are older."

Participants also had a simplistic practical approach to golf in that they believed successful golf entailed hitting a ball into a hole in the least amount of shots possible. The following quote captures the essence of this mindset.

"I just think of golf as there is a ball and there is a hole and I have to get that ball into that hole, how hard can that be? To be honest I had always just stepped up to a ball and hit it and never really thought about the process." (P2)

The Importance of Deliberate Practice Post 16

In terms of golf, a clear change in practice behaviour occurred aged approximately 16 when the participants learned through interaction with coaches and peers who were connected with the EGU developmental squads about the relevance and importance of engaging with regular golf specific deliberate practice if they were to accomplish their life goal of becoming a touring professional golfer. At this stage, they soon began to realise that they would need to take their approach to golf much more seriously if they were to successfully bridge the gap to the senior levels of golf performance. As participant six said.

"hanging out with the England boys and watching them practice made me see how far I am away from what I need to be doing if I want to make it. I just need to practice so much more and so much more harder really especially on my short game as this is all the England boys do for hours on end."

Although it was clear how participants did not enjoy practicing as much as playing golf during their early golf career, they had all realised by the late teenage years how long term exposure with golf specific deliberate practice was paramount for their on-going

development as an aspiring world class golfer. Participant four described how through the guidance of both EGU and personal coaches he adopted a "practice to improve and not for fun anymore" approach to his golf development. In the quote below, participant seven discussed how spending a few training weekends at Woodhall Spa with other adolescent England internationals made him realise the importance of refining his practice behaviours towards a specialised deliberate practice approach if he was to continuing improving as a golfer.

> *"I never really took things in golf serious and this was what I did until I left college really but now I know what I need to work on and why and how doing this will make me better. I do not play half as much as I used to but that makes it so good now when I do because I thrive off playing well and getting better and practicing right is the key."*

Akin to the beliefs of deliberate practice theory, participants felt the need to start working much more intensely on all aspects of their golf post 16, but with a particular focus on short game instead of playing competitive events or practice rounds. Participant five stated how he "*realised he needed to work on his short game as it was so important at this level*". Whilst initially "torn" between continuing to play regular competitive golf or undertake specialised training for the first time, they did not dwell and soon realised how every practice session needed to have a rationale and purpose if they were to continue improving as golfers. To emphasise, participant two stated.

> *"I look at it like a ladder and I am half way up and to get higher I have to put the practice in and not just any practice you know but that practice that makes you tired and sleep at night if you get what I mean."*

Balance of Power with Coaches

The primary roles undertaken by the participants personal coaches tended to focus upon the refinement of technical aspects of their game and forging links with EGU coaching

staff, tour players and golf representatives. This was particularly the case for participant eight who said.

> *"my coach knows lots of the tour players in the area and has coached them all for a bit of time and he gets them to practice with me and give me tips on my short game."*

As a serious approach to golf was only taken around 16 years of age, many of the sample had never encountered any technical golf lessons before which did not seem to bother the participants. These sessions started to increase in volume post 16 and tended to focus upon refining any swing and posture problems which they had identified themselves as areas which may inhibit their on-going development. Participant two described how he was well aware of his limitations as a golfer and subsequently sought to improve his swing through the assistance of his personal coach.

> *"it was all technique based work really because at that time I had a very boyish swing that was long and flimsy and when it was good it was good but when it was bad it made my game inconsistent so it was all geared towards making my swing shorter and more consistent and he has done a good job."*

Participant three illustrated how he worked with his coach to ensure the fundamentals of his golf swing were best suited to allow for performance improvement.

> *"I used to swing the club quite flat so he (coach) just used to work on getting me to hit the ball on a better plane of the club and getting the basics right really, just getting everything better, grip, posture, erm then I continued to see him up until today really and I still see him now on a regular basis."*

Participants valued highly the role that the county and EGU coaches provided in their on-going development post international selection. Clear performance improvements

were noticeable after a matter of weeks which were integral in the decision by participants to make a commitment to golf and try to pursue a professional career in the sport. Participant three highlights this experience particularly well.

> *"when I first got into the county set up it was great because it was the first time I had ever got any proper professional coaching and we hit it off straight away and we well more me really decided I wanted to work on my swing and that is what we did and I kept at it for days on end then suddenly bang and my performances just moved up another level. It was so good and gave me so much confidence as it was the first time I had really tried properly in golf and here I was making such big improvement in no time at all."*

Non-Linear Development Pathways

The rates of golf progression encountered were not always linear and participants experienced peaks and troughs along the way to securing adolescent excellence status. Participants discussed how the encountered deteriorations in their levels of performances for periods lasting between seven days to one year between the ages of 13 to 17. For example, participant five said.

> *"every golfer in the world has a bad patch in their time and you just have to take it on the chin, learn from it and get your head down and turn things around."*

Factors attributed to these slumps in performance included the effect of growth spurts, swing changes, parents divorcing and the pressures of completing A-levels. The quote provided by participant seven captures the meaning of these examples particularly well.

> *"I was aged about 18 and I just had one of those weeks where I could not hit a barn door. Well, my game had gone to put but I had a few problems in my personal life which just meant I couldn't concentrate like normal and*

this really ruined my game at the time. When I look back I laugh now because I sorted the problem out and straight away my game returned to normal and actually I am glad I had this experience because it made me stronger mentally than before."

Sacrifices made to Pursue Excellence

Many sacrifices which were invariably self-determined were made by participants during the latter teenage years to assist them in achieving their golf career goals. Examples included exiting mainstream education aged 13, not having girlfriends, engagement within a limited social and sporting life and declining the offer of a university sports scholarship in America. The following account by participant four emphasises the nature of the sacrifices he has made throughout his golf career to date in an effort to maximise the potential of securing golfing excellence at the senior level.

"it is really difficult in golf because I feel that I have lived a different live compare to my friends, it is just not the same because I always have a tournament around the corner and it is very intense, a sport that everyone knows if you go out the night before you cannot turn up the next morning and play quality golf. I find that I have never had a massive social side really especially in the summer as the focus was to just play and practice."

Strategic Approach to Developing Excellence

Long Term Career Development Plan

Many of the participant accounts revealed how a range of strategic behaviours were a constant feature of everyday life post 16 years of age. All participants were ambitious, decisive individuals whose long term goal of securing golfing excellence was central in the way they approached and lived their lives. To illustrate, participant five stated how he "*was determined not to let him and his family down by not making it onto tour after*

everything they have done for me". Participants realised how they may have the potential to become an aspiring elite adolescent golfer through self-referencing their abilities with peers and associates and formulated a long-term career plan to help achieve their goals. This process occurred because participants had now identified golf to be an activity that could provide them with a sense of achievement and fulfilment in life. For example, participant three said.

> *"I never really tried before at golf and was ok so I should become pretty good when I put some real effort into it."*

In another example, participant one discussed the moment he realised he may actually be able to forge a professional career for himself in golf.

> *"well I was well into my other sports as well at the time and I just got picked for the under 16 county team as they were a few short because of injury and I wiped the floor with them all and when everyone was making a fuss about my performance after I just had one of those moments when I thought to myself good god how good could I actually be if I actually started doing my golf seriously and putting all my effort into it."*

Participants also made a series of strategic decisions post 16 which were all tailored to complement their on-going development as golfers. Examples included refraining from entering the further and higher education systems or obtaining full-time employment in an effort to increase their chances of achieving their life goal of becoming an elite professional golfer.

Considered use of Resources

Rather ruthlessly, participants disposed of anything they perceived may impede their quest in becoming a professional tour player. For example, all participants between the ages of 16 – 18 stopped participating in any other sports except for ones they thought may benefit their golf in some capacity in the long term (e.g., selected participants

explained how they undertook regular badminton matches with peers to help maintain general cardiovascular fitness levels) and transferred their membership from their primary golf club to a prestigious club that had high quality short game training facilities and contacts with county and EGU representatives. For example, one participant stated.

> *"the big wigs at Woodhall wouldn't have found out about me if I had stayed at Hesham because they are only a small and we are way up north as well which puts them off coming to watch me I think."*

Changing clubs also exposed the participants to a wider pool of wealthy club members who as participant three said "*could be worked on to see if they can offer any help as they like to see the young ones having a real go*." The following account captures the mindset of an aspiring elite golfer who was struggling to gain selection for his county team prior to transferring to a prestigious golf club located within the North-West region.

> *"I did not get picked for Lancashire until I joined Southport and Ainsdale. Everyone used to say that the club I was a member at like was not a big enough name really and that's why I got out, well I am still a member here but I went and joined a bigger golf club really and as soon as I joined there I got in at Lancashire at the age of 16."* (P3)

Participants also tended to socialise with fellow elite sports performers who were older professional golfers once they have secured international recognition. In the case of participant eight, this "*helped to get my name out on the scene.*" They also restricted their involvements with non-elite golf players and non-playing peers, friends and school colleagues who they used to socialise with on a regular basis during childhood and early adolescence. Participant three discussed why he stopped seeing his old school friends once he decided to pursue a career in golf.

"*they will always be my mates like but we have nothing in common now like we did at school and I want to be a professional golfer so bad they think I am mad and cannot see why I make the sacrifices I do like not going out in town. I still see them from time to time but they do not really like golf and are at college with their new mates and prefer going out with them and doing other sports so that is fine and I am ok with it but I will always consider them as mates even though I do not see them much anymore."*

Participant six also explained how he has recently developed a friendship with an elder professional golfer who delivers coaching sessions to members at his home club on an ad hoc basis.

"in terms of golf friends, there is a touring professional at the club who I see all the time now. He is not on the main tour but has played on it and when he has seen me practicing down here he has always talked to me and he has played for years on the tour and managed people who play on it so he knows how it works and he has passed on lots of little bits of advice that are little things but big things really and has really helped me now in how I prepare and go to tournaments now."

Emergence of Networking Skills

Once the decision to try and become a touring professional golfer was made, participants, and their parents to a certain extent, displayed proactive, forward thinking strategic behaviours to identify people whom they considered may be able to help them to accomplish their life goal. Participants tended to seek out the strengths of all individuals they encountered in life in the belief they may be able to assist them in achieving their life goal of reaching the world class levels of senior golf performance. The quote by participant eight endorses this mind set.

"I try to make as many connections as I can because you never know who may be able to help you out and where and it could be the local person at the golf club who plays once per week but gives you that valuable piece of information that could help you in the future you just do not know."

When the decision to specialise in golf occurred, participants knew what they needed to do and who they needed to impress to secure selection for EGU squads. Examples of this strategic mindset and approach to their golf development included the recruitment and long term association with county coaches involved in the EGU infrastructure and selection committee and seeking out potential financial benefactors such as club members, local businesses and current and ex tour professionals/coaches for coaching and lifestyle advice and practice partners. As participant six revealed.

"you have to be like a sales man really in golf to get up the ladder. It is all about buttering the right people up and just getting yourself known and doing the business on the course when they want to see it."

Contingency Plan

Displaying their strategic forward thinking approach again, most participants had also devised a career contingency plan to fall back on in later life if their life goal fails to materialise (e.g., in case of severe injury). Examples of alternative career routes, which were all golf specific, included training to become a professional club coach/professional, golf facility or event manager or pursuing a golf management or coaching focussed university education.

Role of Psychology in Developing Excellence

Change of Motivational Orientation

Primary motives for participant engagement within golf were extrinsically focussed (e.g., I love to win) and reinforced by fathers. The trimmings of success such as the

large and immediate improvements in performance which were encountered during the early stages of their golf careers were also highly motivating for the participants. This was emphasised by participant two who commented.

> *"I just loved smashing the course up on a weekend as a kid with my dad and his mates to just win. They hated me beating them but it was easy for me and they hardly ever beat me and I was the talk of the club when I did this and everyone used to chat to me about my golf."*

During childhood and the early teenage years, participants tended to displayed ego orientated motivational orientations, such as participant five who said "*I just loved being the best junior in the club*" and success was gauged through defeating peers who tended to be older and attracting attention as a promising young player in the club. Participants relished the "attention" they received from club members and they enjoyed winning and the fact that they did not have to practice excessively to do so. As they become increasingly committed to golf and made the decision to became full-time amateur golfers, their motivational orientations evolved from a primarily extrinsic and ego orientated focus towards an increasingly intrinsic and task orientated focus. For example, whilst discussing their motives for playing golf, participant four recounted.

> *"I used to just think about winning all the time against everyone I played but now the coaches with England have told me to think more about improving all parts of my game by a little bit as this will make bigger improvements in the long run and In guess what they say is right actually because as long as I am improving is all that matters and not what my opponents are doing."*

Participant five explained how he "*tried to start setting personal bests in all my putting tests that the coaches with England showed us all to do all the time*" and participant two stated how he "*loved competing against himself in every practice session*". This shift in

motivational orientation was demonstrated by the high levels of satisfaction they encountered in undertaking specialised deliberate practice regimes across all aspects of their game on a daily basis. This new approach to practice also increased motivation levels through the fact that they started to hit the ball further, harder and higher than ever before in terms of their long game and much more precisely during their short game. Participant one provided the following narrative which clarifies this process very well.

> *"just watching the ball fly off from the tee after a good tee shot makes me feel so good just like what I feel like after a run and makes the hours of practice behind the shot seem worth it really. I just like being good at golf and it makes me feel better as a person and it is the thing I am best at in life really so it is so important to me really. What I love so much about golf is it does not lie. You play bad and you score bad so there is just no getting away from it and that is what I find so appealing about the game, you just cannot hide like you can in other sports and you find out where you need to put the hours in if you want to get better. I just love every minute of it."*

Participants also valued the experience of competing internationally extremely highly as these experiences tended to fuel intrinsic motives and stimulate an awareness of their current areas for improvement. As participant four discussed.

> "*I was playing one of the best amateur players in the world and how could I not let that help me. I was watching everything he did like his approach to the ball, everything. I thought this guy is the man and he can help me learn*."

Learning from Errors

Significant experiences were encountered by the majority of participants during their early teenage years which appeared to positively influence and shape their aspirations to

achieve international status as senior golfers in the future. These episodes were predominantly negative in nature such as encountering a humiliating performance within national or international golf competitions or periods of poor form that attracted critical reflection and interrogation of oneself from others. Interestingly, many participants used these "wake up calls" in a positive manner to "bounce back" and reassess their long-term approach to their golf development. Participants were used to success not only in golf, but other sports at this stage of their learning, and for many this was their first experience in life of a significant defeat or failure. Selected participants provided the examples below which demonstrate how these negative episodes acted as key drivers to fuel on-going motivations to improve as golfers and their future career aspirations.

> *"my first main event the Reid Trophy and I was 12 years old and up to then it was all about fun and playing the game and just a little practice but it was a massive eye opener playing in a national standard tournament because you are the best player at your club and county for your age and you think you are the best around then you get to play in one of these big events and you realise you are nowhere near the best and there are a lot of other people out there who are the same age as you and they are undertaking structured practice, they are hitting better shots, they are bigger guys and are hitting the ball further even though you are the same age and it just makes you realise that you have to put in some practice to become as good as them."* (P7)
>
> *"well the main learning point for me was the McGregor Trophy in 2008 when I first won that competition and it gave me a real wakeup call regards what I need to do to get to where I needed to be and I can remember looking at the putting green where all the England Boys were and thinking wow I*

wish one day I hope I can get into that and then after winning it really made me focus and achieve my aim of getting into the England set up." (P8)

Role of Praise and Recognition of Achievement

Praise and recognition of achievement from parents and peers were important to the participants long term motivation towards golf and their sense of well-being and the quotes below demonstrate this point and the quotes below highlight this positive influence.

"at Southport and Ainsdale it is completely different. All the members want me to do well, they support me and ask me how I am doing and are always disappointed when I do not do well and they come and support me at local competitions by coming to watch." (P3)

"the people at the club are really good and they all know what I am doing and always chatting to me asking me about what have I been doing and where have I been and I feel that helps just talking to other members to give me confidence in my game and they always encourage me to keep going at it and that means a lot as well. Sometimes you cannot have a great game of golf and you come back in and you are a bit down and they help me." (P4)

"I just picked the game up very quickly and if you pick something up quickly you just want to get better and every day I went out there I was just improving and hitting the ball better and it was a great buzz to see myself improve and everyone tell me so when I was younger." (P7)

Role of Critical Reflection in Development

Since the decision to specialise in golf was made, participants become progressively self-critical about their levels of performance and focussed their training towards addressing areas of their game which they perceived as being weaknesses. The

following extract highlights the actions undertaken by a participant after he failed in his attempts to gain selection for the Walker Cup golf squad in 2009.

> *"I did very well in the events but not good enough to get into the Walker Cup squad, I need to get stronger and fitter so I can hit the ball further. I mean pretty much I do not want to stand still in any area as I can always do better in everything and I will do the same thing at the end of the season like I did last winter where I sat down and looked at every area of my game and work out what I need to do to improve like there are little technical, physical and mental things that I can increase by a few levels as well."*

All participants at the time of data collection were dedicated and single minded in their pursuit of achieving golfing excellence. A key finding to emerge from the interviews was how the participants had become increasingly meticulous in their professional standards, preparation for training and competitions and post-practice and competition reflections since they decided to specialise in golf. One of the participants discussed how undertaking reflection was "*boring and hard at first and the England coaches drill it into us all the time and my own coach at Whitehaven does also but I think it is good as all the best players with England do it*". Additionally, the following quote by participant three demonstrates how the role of critical reflection is now crucial in his on-going development as a golfer.

> *"I always ask myself the question when I am lying in bed at night have I done enough today and this means more than just practicing but everything else that comes with being a top golfer like the prep and reflection because at the level I am at it is so important to do things right as it is a tough sport to do well in and I want this so much and I do not want to look back when I am old and say I did not give it my best shot."*

Discussion

The primary aim of this chapter was to explore the experiences of the pathways travelled by elite adolescent golfers using IPA. The findings expand on study three by revealing how in addition to encountering an extremely enjoyable and diversified introduction to many sports throughout childhood and early adolescence; they were ultimately driven in life by the need to excel and demonstrate competence. The findings of the study suggest how all participants identified golf aged around 16 as an activity through which they may achieve this accolade in the long term. It was also interesting to note how they were all very well aware of the key steps and decisions that they needed to take in achieving golfing excellence (e.g., when they needed to start specialising in golf and what types of golf specific training they needed to start undertaking) and undertook a strategic approach in doing so.

The notion that parents have a significant influence upon the sports participation trends and developments of their children and successful athletes have more parental involvement than less successful colleagues is both well documented in the existing literature (e.g., Carr et al, 2000; Kirk et al, 1997) and evident within this study. Participants were highly appreciative of the multi-faceted roles played by their parents throughout their golf careers to date, and especially their mother's post 16, but they also liked the fact how their parents were never looking to take control of their development.

Research suggests how sport and physical activity participation patterns undertaken by children parallel those of their parents (Côté, 1999; Davison et al., 2006; Scheerder et al., 2006), which was consistent with the findings of this study. Wide ranging research has also discussed the significance of motivational support, praise and encouragement

provided by parents, coaches and peers as decisive factors towards progression and accomplishments of talented individuals (Anderson, Would, & Torsheim, 2006; Côté, 1999; Côté, Bruner, Strachan, Ericsson, & Fraser-Thomas, 2010; Cskikszentmuihayli, Rathunde, & Whalen, 1993; Durand-Bush & Salmela, 2002; Eccles, Wigfield, & Schiefele, 1998; Fraser-Thomas, Côté, & Deakin, 2005; Fraser-Thomas & Côté, 2006; Keegan et al., 2009; Mallett & Hanrahan, 2004; Vernacchia et al., 2000). For example, the study by Wolfendon and Holt (2005) examined the development of young tennis players and found parents played a significant role in their child's development through offering emotional and tangible support when necessary.

This finding was partially supported in the study as parents, and especially father's pre 16 and mothers post 16 years of age provided pastoral, emotional and financial support. Examples included the considerable financial contributions towards teaching and equipment costs during the early years of their sons golf careers whilst considerable amounts time were spent transporting their sons around the country to and from training events and competitions.

This study also revealed how extended family members took an increasingly distant interest into the participants golf development once they had reached the international level of performance. The findings also replicate the study by McCarthey and Jones (2007) which found participants enjoyed playing sport when their parents were actively involved. The study also revealed how parents encouraged their sons to make decisions for themselves regarding their sports participation and practice trends which aided the process of becoming increasingly self-aware autonomous individuals in the long term. The study also revealed how golf had become central to the lives of the immediate family unit by the time the participants were competing on the international stage.

Participants thrived on the fact how golf was now embedded into the day to day culture of the family as it enabled them to spend time together although they were heavily involved in practicing and competing. In support of this finding, Fallon and Bowles (1997) found how the structure and functioning of the family unit had an effect on the way young people spent time with their peers or their family.

Participating in a range of sports which included golf played a major part of the participants lives from a young age. They also found diversified introductions to sport to be highly pleasurable and they strived for opportunities in many sports where they could experience challenge, fun and enjoyment. This finding opposes previous research which suggests young people's experiences of participating in sport are not necessarily always positive and can be emotionally painful (e.g., Brettschneider, 1999). Another key finding to emerge from the study was how participants had no initial preferences for any particular sport as they demonstrated competence across all activities when compared to peers. The majority of participants were capable all round sports performers who thrived on the opportunity to compete instead of practicing and this approach to development was beneficial in all sports but especially golf where significant reductions in yearly handicaps were evident. Linking with research by Côté et al., (2006), participants were very much aware and grateful how they resided in an area that offered more opportunities for participation and competition in golf such as greater amounts of facilities and golfers to compete against.

One of the main reasons why the golfers specialised in golf was because they realised it was an activity in which they could demonstrate competence and increase their self-worth. This links well with research by Bandura (1997) who stressed the importance of perceived competence in an individual's decision to both engage in and maintain

involvement in an activity. Talent development researchers also suggest the paths travelled by elite sports performers as they develop from novice to expert status are non-linear and idiosyncratic (Abbott & Collins, 2004; MacNamara et al., 2010; Vaeyens et al, 2008). Support for this approach to development was also provided in this study as participants undertook a wide range of sports at different stages of their development, although the timeframe in which they specialised in golf was relatively small (between 16 & 18 years of age).

Once participants made the commitment to achieving excellence as a golfer, they started to undertake significant volumes of golf specific deliberate practice instead of competitions and practice rounds which they found both enjoyable and highly relevant to undertake. This finding is consistent in the deliberate practice literature across sports including soccer, wrestling hockey and figure skating (Helsen et al., 1998; Hodges & Starkes, 1996). It was clear how the participants had realised the importance of deliberate practice in terms of achieving their career goals and were highly motivated to do so in all cases. Consistent with deliberate practice theory, practice from 16 years onwards was highly specialised and tailored towards improving self-identified weaknesses. Whilst participants valued the expertise that the county and EGU coaches had to offer them, they only used their services occasionally which tended to be for advice on technical elements of their existing performance levels.

Participants relied heavily on their networking skills from 16 years onwards to form and maintain new relationships with individuals who they thought may be able to assist them to achieve their long-term goal of becoming a touring professional golfer (e.g., national selector, professional golfer or financial benefactor). Once a pledge to long-term deliberate practice was made, participants became increasingly selective towards

the calibre and amounts of competitions they played each season which is consistent with the behaviours of elite swimmers (Johnson et al., 2008).

Engagement with daily deliberate practice was an enjoyable experience for the participants to undertake and helped to develop an increasingly task as opposed to ego orientated motivational climate which in turn promoted intrinsic motivation to practice and improve current performance levels. This finding is similar with the findings of Côté (1999) and Holt and Dunn (2004) which indicated how a long term commitment towards securing expert status in sport is strengthened if individuals consistently enjoy competing and practicing in sport.

In agreement with previous research by Biddle (2001), Côté et al., (2009), Jess et al., (2004), Soberlak and Côté, (2003) and Treasure (2001), participants also become increasingly committed and self-determined in their pursuit of excellence as they grew older. Data also showed how they had ultimate control over key developmental decisions such as choice and amounts of time spent engaged with sports from an early age which was a factor both Bloom (1985) and Csikszentmihalyi et al., (1993) found to be critical towards attaining and maintaining world class performance across many domains.

As golf started to be taken more seriously by the sample, they started to use a wide range of psychological strategies to aid their development. This finding is consistent with a growing body of research which reports how single mindedness, discipline, intrinsic and self-determined motivation, resilience, decision making, critical reflection of self and perseverance appear decisive for the growth of exceptional sports performers (see MacNamara & Collins, 2012 for an overview). The role that psychology has to

play in golf performance is well researched and Hellstrom (2009) who investigated the psychological hallmarks of professional and amateur golfers with handicaps of less than four revealed attitude, desire and motivation were important psychological qualities necessary to succeed in professional tournaments. In agreement with the findings of this study, participants were also committed to golf, had clear aims and objectives which they strived to achieve, were well organised and planned, critically evaluated their performance in both practice and competition environments.

The research by McCaffrey and Orlick (1989) who undertook qualitative interviews with 14 touring professional golfers and nine teaching professionals also maps well with the findings of the study as it revealed how commitment, psychological preparation for quality practice, tournament planning and imagery training were associated with excellent golf performance. Additionally, Petlichkoff, (2004) discussed how few development models systematically encourage the development of self-regulated learners and Miller and Byrnes (2001) stated participation in elite sport may stall the development of athlete independence. However, participants in this study displayed the hallmarks of self-regulated learners as they are able to focus independently on self-improvement and only saught guidance and support from others once selected for EGU squads (e.g., parents) when necessary (Zimmerman, 2000).

Limitations

A cautionary note regarding the retrospective design and nature of the accounts provided in this study must be acknowledged as retrospective data is vulnerable to respondent bias and poor articulation (Warriner & Lavallee, 2008). Also, the findings of this study are limited to the quality of the accounts provided as IPA is ideographic and focuses only on experiences from the perspective of the participant.

Implications and Recommendations for Future Research

The theoretical implications of this study lends support not only to the role of deliberate play (Côté, 1999) in acquiring adolescent golfing excellence but also the key function that deliberate practice (Ericsson et al. 1993, Ericsson 2007, year) played in maintaining on-going golf performance improvements throughout late adolescence. The findings of this study also identify a number of practical suggestions and implications for facilitating the development of future generations of adolescent golf performers. Primarily, the findings provide greater insights into the valuable role that parents provide to their children throughout the development process, and particularly when the child has made the decision to specialise. Secondly, the findings show how all participants travelled a diversified path that encourages children to engage with golf from an early age whilst maintaining a fun, non-competitive focus and involvement in a range of other sports.

Thirdly, the importance of self-regulatory skills and the role that psychological characteristics may have to play in achieving elite adolescent levels of performance is consistent with an emerging pool of talent development in sport research (see Jonker, 2010 for a review) and the intention to develop the ability of aspiring elite adolescent golfers to learn independently and become increasingly critically self-aware and reflective should incorporated into future coach education and talent development in golf systems. Further research may also use IPA to understand the interpretations and meanings of aspirant elite golfers who have failed to reach the elite levels of performance and senior level world class golfers who are regular performers on world class golf tours.

Conclusions and the Next Step

In conclusion, this study identified how elite adolescent golfers experienced supportive parents and a diversified enjoyable introduction to sport. This was followed by a self-determined commitment to golf in the mid teenage years and a strategic approach to developing excellence which acknowledged the role that psychology may play. Based on the data presented, adolescent golfing excellence appears achievable through limited exposure with deliberate practice during childhood and the early teenage years, although the introduction of highly specialised practice schedules from approximately 16 years old appears critical for maintaining on-going performance improvements which may assist in the successful transition from aspiring to elite adolescent golfer status in the future.

Collectively the findings of studies two and three reveal how deliberate practice played an important role in the continued performance improvements of elite adolescent golfers from roughly 16 years of age onwards. However, whilst the lesser skilled participants in study one tended to encounter significant improvements in their golf performance, they did so without engaging solely with long-term golf specific deliberate practice regimes. Instead, the majority of golf activities golf competitions they undertook were categorised as competitions and practice rounds in which high levels of mental and physical effort were exerted.

Therefore, the aim of the next study in this thesis was to develop a focussed deliberate practice training intervention for high performing but non-elite adolescent golfers and to examine the effect it may have upon their putting performance and future practice behaviours. Importantly, the findings of this study will make an original contribution to the sports expertise literature as limited amounts of research exist which have

investigated the effects of training regimes with high performing athletes who are located in the autonomous stage of learning.

CHAPTER 6

STUDY 4

THE INFLUENCE OF A DELIBERATE PRACTICE INTERVENTION UPON PUTTING PERFORMANCE AND SUBSEQUENT PRACTICE BEHAVIOURS OF ASPIRING ELITE ADOLESCENT GOLFERS

In study one it was found that 77 percent of the participants reduced their golf handicap by either by one or two shots over a period of nine months. A large proportion of the golf activities undertaken throughout this time frame were predominantly competitions or competitive practice rounds (62 percent), in which mental and physical effort was high, with only occasional exposure with deliberate practice activities per se (e.g., structured drills). The findings of studies two and three revealed how elite adolescent golfers who started to undertake golf specific deliberate practice as a training strategy for the first time aged approximately 16 went on to encounter continued reductions in golf handicap throughout their later adolescence and early adulthood. The implications of these three studies suggest deliberate practice regimes may be an appropriate strategy to undertake for aspiring elite golfers who are situated in the autonomous stages of the learning process where margins of improvement over time may be small.

Justification for using Single Subject Designs

Whilst a comprehensive literature from within the motor learning domain has revealed how novice participants generally show rapid improvements in golf performance after short term exposure with laboratory based golf specific practice interventions (e.g., Lam, Maxwell, & Masters, 2010; Maxwell, Masters, Kerr, & Weedon, 2001; Maxwell,

Masters, & Eves, 2003), no research has previously examined the influence of a deliberate practice intervention upon the performance and future practice behaviours of highly skilled adolescent golfers with no previous experience of undertaking specialised golf specific training regimes. The existing golf specific motor learning literature was also developed primarily through group designs research where participants were exposed to either an intervention or control condition and instructed to complete a set number of trails at one or more points in time. Critically, the efficacy of these studies in terms of shaping future high level performance training regimes is low as they used beginners instead of aspiring elite and elite participants who are situated in the cognitive stage of the learning process which is different phase of the learning curve than the associative or automatic stages (see Fitts & Postner, 1967 for an overview).

At high levels of golf performance where competitions are played over several rounds, small performance improvements may lead to notable outcomes for the performer. This theory is supported by Alexander and Kern (2005) who highlighted the importance of excellent short game skills at the world class levels of golf competition through their analysis of tour earnings and competition placing on the professional golfers association tour in America. The findings of this study support the decision to expose aspiring elite adolescent golfers with a short game specific deliberate practice intervention as senior professional golfers who demonstrated superior short game performance statistics won more tour events and earned greater amounts of prize money in comparison to their peers. Further justification for developing a putting intervention was provided by the findings of studies two and three where participants revealed how they spent larger amounts of time undertaking short game specific deliberate practice than any other component of their game.

A method which is particularly well suited to examining the effects of practice interventions upon the performance of high level performance sports performers are single subject designs (SSD) as they may distinguish any small changes in performance that may not be significantly detected in group design research. SSD research is an approach that has been employed for decades to define basic principles of behaviour and establish evidence based practices (Horner, Carr, Halle, Odom, & Worley, 2005). This research method is defined as experimental in nature and its purpose is to identify causal or functional relationships between independent and dependent variables (Horner et al., 2005). It has also been used across a wide range of disciplines in recent years including injury rehabilitation and clinical psychology (Bobrovitz & Ottenbacher, 1998; Kazdin, 1998).

The aim of the SSD approach is to observe participant outcomes (e.g., performance indicators) as a dependent variable at numerous time points and to compare any changes to assess the effect of the intervention (Kinugasa et al., 2004). The SSD approach is characterised by ongoing data collection across baseline and treatment conditions and typically use between three and five participants (Hrycaiko & Martin, 1996). A range of different models of SSD across multiple baselines exist. The AB design is the most basic SSD design (Barlow & Hersen, 1984) and involves repeated measurement of data through phases A and B of a study (Kinugasa et al., 2004). Phase A represents the baseline stage of a study where the intervention is yet to be introduced. In phase B, the intervention is introduced and the data is screened to detect for any changes in performance or behaviour. More sophisticated SSD methodologies are available which include the reversal (ABA) multiple baseline and alternating treatment designs (see Barlow & Hersen, 1984 for an overview). During SSD research, all participants are exposed to both baseline and intervention conditions and post experimental social

validation procedures and treatment effects are generally judged by visual inspection instead of statistical analysis of data.

In recent years, SSD have become a popular approach with sport psychology researchers to assess the efficacy of various mental skills interventions including goal setting, imagery, self-talk, hypnosis and relaxation techniques upon sub components of athletic performance (Bull, 1989; Callow & Waters, 2005; Calmels, Berthoumieux, & d`Arripe-Longueville, 2004; Johnson, Hrycaiko, Johnson, & Halas, 2004; Jordet, 2005; Munroe-Chandler, Hall, Fishburne, & Shannon, 2005; Swain & Jones, 1995; Thelwell & Greenlees, 2001, 2003). The comprehensive sport psychology research that has employed a SSD approach are characterised by their length (typically 11 – 14 weeks in duration), small and specified sample sizes (e.g., between three and five elite or aspiring elite level performers) and their reliance on the subjective assessment criteria recommended by Hyrakio and Martin (1996) to identify any individual differences in performance between participants instead of undertaking statistical analysis (see Martin, Thompson & Regehr, 2004 & Kinugasa et al., 2004 for an overview).

For example, the study by Patrick and Hrycaiko (1998) examined the effects of a mental training package consisting of relaxation, imagery, self-talk and goal setting upon the performance of a 1600 metre run. Participants were one male elite 1500 metre runner and three male elite tri-athletes who had never utilised any mental skills programmes before in a systematic manner. The findings of the study found the mental training package was effective in improving 1500 metre running performance and a positive relationship existed between levels of mental skills usage and running performance. The intervention and results also received a favourable social validation assessment both from participants and their coaches. More recently, Thelwell, Greenlees and

Weston (2006) employed a SSD approach to examine the effectiveness of a psychological skills intervention comprising relaxation, imagery and self-talk upon the performance of five male aspiring elite midfield soccer players. The findings of this study revealed how the intervention enabled each participant to achieve at least small performance improvements for percentage pass and tackle completions and quality of first touch.

There are a number of reasons why an AB SSD across multiple baselines approach was considered as the most appropriate method to use in the present study. Firstly, the participants were categorised as highly skilled and aspiring elite adolescent golfers based on current golf handicaps and were thus situated in a phase of the learning process where improvements in performance may be difficult to detect using traditional significance testing procedures. A limitation of grand mean designs is how the sample mean is used as the representative value of the group which may mask significant information at the individual level of performance (Kinugasa et al., 2004). Instead, SSD methods rely primarily on subjective visual analysis to evaluate and interpret graphical data instead of statistical significance which may overlook small but meaningful improvements in performance that are common at the elite level of performance. Secondly, there are limited numbers of high performance adolescent golfers which fits well with the small sample size requirements of the method. Thirdly, this approach eliminates the need for a non-treatment control group and fourthly enables an individual's performance level to be observed over an extended period of time prior, during and after the implementation of an intervention.

Further justification for using this approach with highly skilled sports performers was provided by Wollman (1986, p.136) who stated "single subject designs allow detection

of successful effects for certain individual subjects who otherwise might have their success masked in a non-significant group. Successful individuals/performers can be examined to see what subject characteristics or other factors perhaps led to performance improvement. Single subject methodology may also be better suited than group designs in working with skilled athletes who will not improve much from pre-training level. Small but consistent changes may be seen in a single subject design but not emerge significantly in a group design. Finally, experiments with single subject behavioural monitoring lend themselves well to tailoring specific programs for individuals engaged in real life sports."

The decision to use an AB SSD across multiple baselines was also taken because they are more effective at controlling threats to internal validity such as carry over effects than reversal designs (Kinugasa et al., 2004). Equally, whilst the majority of data in the existing sport psychology literature have most often been subjectively assessed by visual analysis only, this study will undertake both visual and statistical analyses upon all performance data in an attempt to provide increasingly accurate and objective findings than those reliant on subjective visual analysis alone. All data will also be triangulated once the study is concluded through social validation and five month follow up interviews which will allow participants the opportunity to provide insight into their experiences of the intervention and its impact upon their current performance levels and approaches to practice.

Therefore, the primary aim of this study was to determine if the introduction of a deliberate practice intervention was associated with improvements in short game golf putting performance of aspiring elite adolescent golfers who had never experienced

training of this type previously. The second aim was to examine participant experiences of the intervention and its consequences upon future practice behaviour.

Method

Participants

Participants were five (M age = 16.5, SD = 0.76) male adolescent amateur golfers with a current handicap ranging between three and one (M handicap = 1.4, SD = 0.95). All participants were affiliated with their respective county Under 18 representative teams (including Lancashire, Cheshire, Surrey and Yorkshire) during the 2009-2010 golf season. The competitive playing experience of the sample ranged between two and five years (M = 3.8, SD = 1.3). Informal discussions on an individual level with all consenting participants revealed they had never encountered any forms of golf specific deliberate practice training protocols previously. This was verified through dialogue with the golf coaches based at the institution who retrospectively interviewed the participants and their parents at two separate stages of the selection process for the AASE programme about their golf participation histories and practice trends since childhood to the present. Informed consent was obtained from all participants prior to any investigatory proceedings and ethical approval was granted by the local university ethics committee.

Apparatus

Participants all used a standard right handed putter and standard white golf balls to perform the weekly performance measure and prescribed deliberate practice drills. The putting surface used for all weekly performance measures was a grass section of the

outdoor short game facility located at the academic institution. The surface was flat, level and well maintained by professional green keepers. The performance measure was created by precisely inserting ten golf tees around the circumference of a golf hole. The distance from all ten locations to the centre of the hole was eight feet (see figure 6.1). The deliberate practice drill was created by inserting ten separate golf tees into the ground from 3, 6, 9, 12, 15, 18, 21, 24, 27 and 30 feet respectively from the hole (see figure 6.2).

Procedures

The researcher attended an AASE squad development training day at an academic institution based in the North of England in September 2010. This enabled the researcher to ask the 20 squad members if they would be interested in taking part in a 13 week study examining the effects of "effortful golf practice on short game putting" and emphasised the commitment required. Interested participants where then presented with a 20 minute overview of the research via a power-point presentation by the researcher which enabled him to explain the justification for undertaking the study and introduce the nature of the weekly performance and intervention schedules. All participants were informed how they would also be required to undertake a social validation and five month follow up interview in addition to the 13 week study to which they all agreed. Informal discussions with all consenting participants further clarified how they had never encountered any forms of golf specific deliberate practice training protocols previously. Participants undertook a mixed method 13 week AB SSD (Martin & Pear, 1996) which examined the effects of a golf specific deliberate practice intervention upon putting performance and long term practice behaviour. Quantitative and qualitative data were collated via weekly performance measures, self-report diary logs and social validation and five month follow up interviews (see appendix D).

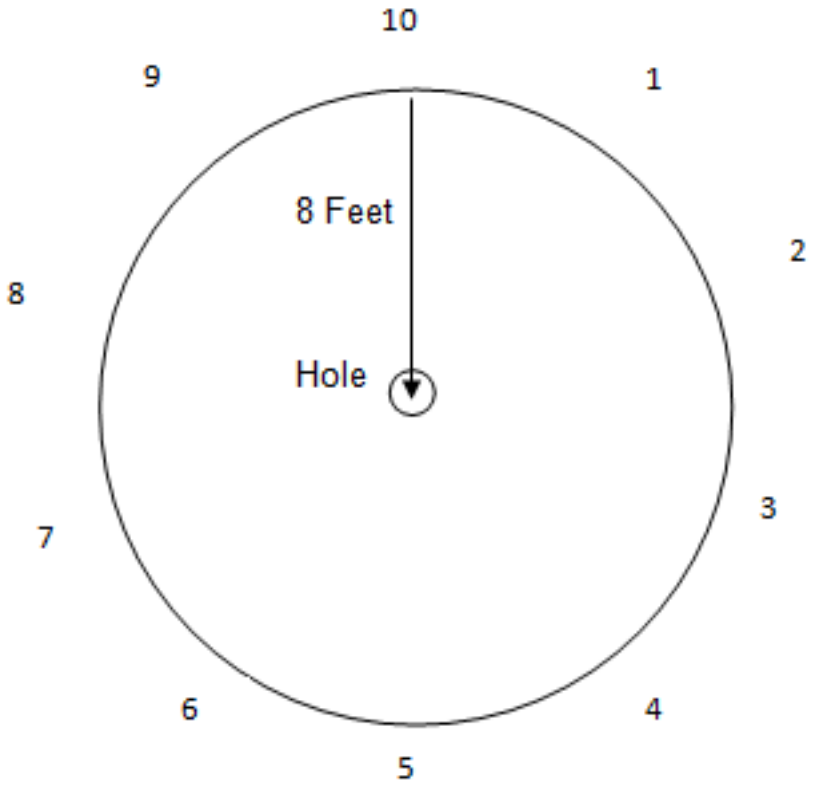

Figure 6.1 Generic Weekly Performance Measure

One week prior to the start of the study, all participants attended a one hour seminar delivered by the researcher at the institutions golf academy which outlined their requirements over the duration of the study. This also enabled the researcher to make certain that the participants fully understood all the procedures they were required to undertake and provide additional clarification for those who were unsure. Participants were also provided with a self-report diary log in which the make-up of the deliberate practice intervention and number of times they were required to undertake both the weekly performance assessment and deliberate practice intervention was explained. Each participant also completed a pilot run of creating the correct measurements from the hole for each shot to be played. To aid their understanding of deliberate practice, participants were also provided with the following definition "*deliberate practice is as a highly structured activity that requires maximal physical and mental effort, is not*

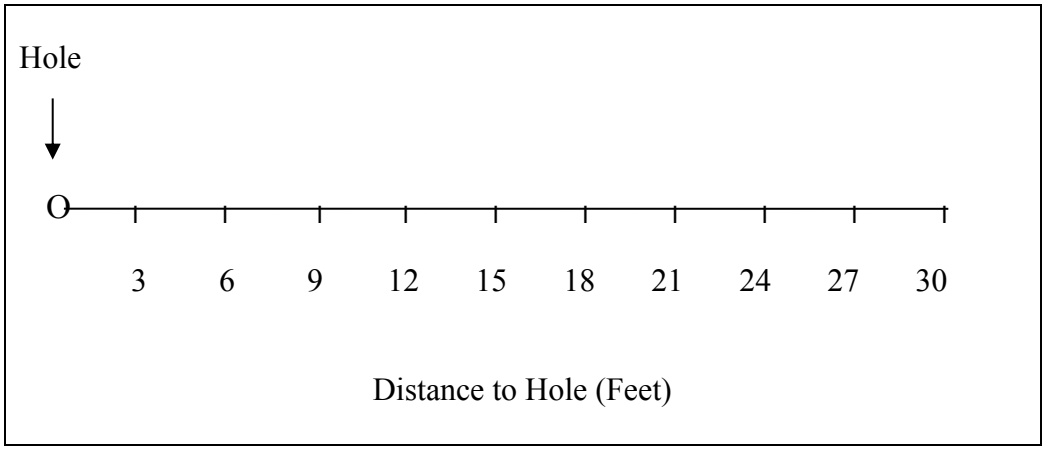

Figure 6.2 Generic Deliberate Practice Intervention with Target Bands Illustrated

inherently enjoyable, generates no immediate rewards and is performed solely for performance improvements" (Ericsson et al., 1993).

The self-report diary log also required participants to record their subjective ratings for physical and mental effort and fun encountered for every deliberate practice drill prescribed on a scale of zero to ten with *zero resembling very very low* and *ten very very high* and the time it took to complete. The researcher demonstrated the deliberate practice intervention and weekly performance measure to all participants and answered any questions posed. The researcher also clarified how all performance measures would be undertaken in a timetabled practice session on the same day and time (Friday of each week commencing at 11.00) for 13 consecutive weeks. The same outdoor putting green which was located at the academic institution was used on all occasions and participants were expected to use their own putter and balls.

The study commenced on the 20th September 2010 and all five participants initially performed a baseline period where normal training and competition regimens were

undertaken. On one occasion throughout each week of the baseline period, participants completed a generic weekly performance measure which comprised ten separate eight foot putts from around the circumference of the hole. Participants were awarded one point if a putt was successfully holed. If the putt missed the hole, no point was awarded. The minimum and maximum scores achievable on each weekly performance measure were zero and ten. Each participant undertook ten shots on all 13 performance measures and started at the same point moving around the circumference of the hole in a clockwise direction.

The deliberate practice intervention was sequentially introduced from week six of the study with all participants undertaking the deliberate practice intervention by week ten (week commencing 22nd November 2010). The choice of intervention used in the present study was informed by the findings from the previous three studies which emphasised the importance of deliberate practice as a strategy for increasing golf performance with highly skilled golfers from the age of approximately 16 years. Collectively, the researcher and head golf coach at the institution developed a short game putting drill that resembled the theoretical framework of a deliberate practice activity. Specifically, the task was highly challenging to complete, required sustained concentration and was designed with the sole purpose of improving performance rather than for enjoyment. For example, study one participants maintained a steady improvement in golf handicap through exposure with regular amounts of effortful competition and practice across all areas of the game over a nine month period. Studies two and three revealed how current elite adolescent golfers started to undertake significant amounts of golf specific deliberate practice post 16 years of age which was mirrored by on-going reductions in golf handicap into the late adolescent and early adulthood years.

Table 6.1

Weeks Spent by each Participant within Baseline and Intervention Stages.

Participant	Baseline	Intervention
1	5	8
2	6	7
3	7	6
4	8	5
5	9	4

The intervention was also endorsed by two British Psychological Society accredited sports psychologists with experience of undertaking applied sport psychology intervention research with elite and non-elite golfers. The design of the deliberate practice drill required participants to perform ten separate putts that were each located at varying distances from the hole. Participants started each drill by performing a 3 foot putt from the hole and then played one putt at the same hole from 6, 9, 12, 15, 18, 21, 24, 27 and 30 feet respectively.

The aim of each drill was for participants to hole all ten putts. Successful putts were awarded two points and a score of minus one was awarded if the ball fell short of the hole. The maximum and lowest scores achievable were 20 and minus ten respectively. The scoring system incorporated into the intervention drill was purely to act as a motivational primer for participants and was not included in any stage of the data analysis process of the study. All practice and testing schedules were undertaken

individually and participants performed the drill twice within each practice session as pilot tests indicated how the drill took approximately 15 minutes to complete.

Each participant undertook four practice drills each week during the intervention stages of the study. This ensured that any changes in performance could confidently be attributed to the administration of the intervention rather than historical effects (Bell, Skinner, & Fisher, 2009; Hanton & Jones, 1999). Therefore, participant one who undertook an eight week intervention period was scheduled to undertake 32 separate drills (this totalled 640 separate practice putts) and participant five who undertook a four week intervention period was scheduled to undertake 16 (this totalled 320 separate practice putts). The head golf coach allocated time during timetabled coaching enrichment activities for participants to undertake two of the four prescribed weekly deliberate practice drills. This meant that the remaining two drills were undertaken during the participants own practice time which in 90 percent of all cases was on the short game practice facilities located at the academic institution. The remaining ten percent of practice drills were undertaken by participants at their home golf club.

Two professional golfers piloted the deliberate practice drill prior to the study commencing. This confirmed how the drill was challenging, required maximal physical and mental effort throughout and took approximately 30 minutes to complete the 20 putts. This finding fits well with the recommendations made by Ericsson et al., (1993) who recommend the maximum amount of time that may be spent undertaking deliberate practice regimes on a daily basis should initially be as little as 20 – 30 minutes for participants with no previous experience of such training strategies. Based on these figures, each participant was expected to be undertaking between approximately 90 – 120 minutes of golf putting specific deliberate practice per week. Participants were also

informed how the deliberate practice drill was to be undertaken once on four separate days throughout a week which could not include the day when the performance measures were undertaken, which in all cases was the Friday of each week.

Self-report diary logs were maintained by all participants throughout the intervention phase of the study for three purposes. Firstly, inspection of data enabled the researcher to verify the completion rates of prescribed practice schedules. Secondly, it allowed for the duration of each practice drill to be determined and thirdly, this approach enabled a subjective evaluation rating with zero resembling *'very very low'* and ten *'very very high'* for levels of physical effort and mental effort exerted and fun experienced during each practice drill session to be recorded. Participants were instructed to complete the diary log immediately after a practice drill was completed. Manipulation checks were also undertaken by the researcher who scrutinized diary logs twice per week during each week of the intervention phase to track adherence levels to prescribed practice schedules.

In compliance with many of the sport psychology studies that have employed SSD, participants also undertook a social validation interview which comprised eight questions in the week after the study was completed to obtain insights into the participants experiences and perceived effectiveness of undertaking the intervention (week commencing 13th December 2010). The interviews took place at a location of the participants choice which in all cases was the golf academy based at the academic institution. The interview started and concluded with the following questions "has the deliberate practice intervention proved useful to you" and "how satisfied were you with the outcomes of the deliberate practice training program" and included appropriate prompts when deemed necessary by the researcher to gain further insight into

interesting data topics which emerged (e.g., please could you explain how this was different to what you previously did). The semi-structured interview schedule comprised eight questions, lasted approximately 20 minutes (M = 21) and were terminated once the researcher was satisfied theoretical saturation to all questions posed was achieved.

In a unique approach to SSD research, all participants undertook a five month follow up interview which comprised 11 predetermined questions to establish the types and intensities of golf activities undertaken over the five months since the termination of the study. All interviews took place in quiet and private rooms within the golf academy at the institution at a time convenient to the participants. The interview started and concluded with the following questions: "reflecting back on your participation in the golf putting study five months ago, what are your thoughts now?" and "how satisfied were you with the outcomes of the deliberate practice training program? Probing questions such as "please can you explain that in more detail" and "why do you think this occurred" were asked when the researcher wanted to explore interesting accounts further.

The mean duration of each interview was approximately 30 minutes (M = 32) which were terminated once the researcher was satisfied theoretical saturation to all questions posed was achieved. Once the follow up interview was concluded, each participant was thanked for their participation in all three stages of the study and provided with a breakdown of their weekly performance measures which they were able to submit to their AASE year one portfolio as evidence of their ongoing academic and professional development as golfers.

Data Analysis

SSD

SSD research has most often been assessed by visual analysis alone which is a subjective technique of data analysis. Kinugasa et al., (2004) argued how this approach to analysis lacks objectivity and suggested a series of statistical methods that may be appropriate for determining the effect of an intervention by comparing baseline and intervention phases. In agreement with Kinugasa et al., (2004) and Yamanda (1998), the decision to use both visual and statistical analyses in this study was made as it may produce increasingly reliable and objective findings than those based on visual subjective analysis alone.

Therefore, to provide greater precision in determining whether the intervention did promote significant change in the putting performances of the participants, the analysis of SSD data comprised two parts. In part one, data were analysed via visual inspection. Hryacaiko and Martin (1996) provided guidelines to facilitate this analysis process and the accurate determination of treatment effects and they recommended following five guidelines when visually examining data to determine if a consistent effects were established during intervention which included: (1) stable baseline performance; (2) replication of effect within and across participants; (3) number of overlapping data points; (4) timing of effect following introduction of treatment; and (5) size of effect in comparison to baseline.

In brief, they suggest an intervention effect is greater if there are fewer overlapping data points and if participants display similar patterns of response it may be concluded that the effects observed are due to the administration of the intervention. They also claim if there are any large improvements in performance after the administration of the

intervention it can be concluded that the effect is due to the influence of the intervention and not other extraneous factors and an intervention is deemed to be more successful the larger the observed effect is. Weekly performance data of all participants during baseline and intervention data were plotted and examined in line of the recommended criteria above and the vertical line on each figure (6.3 – 6.7) indicates the stage within the study when the intervention was introduced for each participant.

Means, percentage improvements and standard deviations for each participants performance measures during each both baseline and intervention stages of the study were determined to examine whether general trends and within participant performance consistency had changed with the introduction of the intervention (see table 6.2). In part two, mean baseline and intervention putting performance data for each participant were compared statistically using a related t-tests to determine if there were any significant differences between the two data sets. Effect sizes were also calculated to reveal the magnitude of any detected differences.

Self-Report Diary Logs

Replicating the approach used by participants in study one, self-report diary logs were maintained by all participants throughout the intervention phases of the study. This allowed the researcher to accurately determine the completion rates of prescribed practice schedules and the mean duration of each deliberate practice drill. Furthermore, it allowed the researcher to obtain grand mean subjective estimates for volumes of physical and mental effort exerted and fun encountered during each practice session within the intervention stages to ensure they resembled the key tenets of deliberate practice theory. Mean participant ratings and standard deviations for physical and mental effort and fun encountered were determined for each participant during the

intervention stage of the study. This data was then tallied and divided by five to produce monthly grand means and standard deviations for each of the three dimensions.

Social Validation and Follow up Interviews

The same data analysis procedures were used with both the social validation and follow up interview data. Once all social validation and follow up interviews were completed, they were transcribed verbatim and the text was read and re-read on several occasions to enhance the researcher's familiarity and awareness with the data. When the transcribing process was then complete, content analysis following the recommendations of Côté, Salmela, Baria, and Russell (1993) was used to identify repeated patterns of meaning provided by the participants throughout the intervention. This qualitative analysis procedure involves organising data and generating themes from interview data to identify recurring themes. Firstly, each transcript was subjected to inductive line by line analysis by the researcher to identify individual meaning units and raw data themes within participant quotations. Once these initial statements were compiled, an inductive analysis of the data was undertaken throughout the early stages of the analysis process to develop higher order themes that linked similar raw data themes together in a higher order concept. Similar themes were grouped together as either positive or negative perceptions of the intervention.

The next step involved the creation of profiles which reflected the major findings for each individual participant. After this point, deductive analysis using existing literature was employed to refine and develop emergent themes. Finally, several steps were taken to ensure the trustworthiness and validity of the data collated. Firstly, in recognising the risk of miscoding during the data analysis process, a collaborative approach was taken to increase the validity of data which involved an independent researcher who was blind

to the aims and objectives of the study scrutinising the analytic processes employed. For the social validation data, this process revealed an extremely high amount of similarity between the two sets of themes and the occasional disagreement in interpretations were all solved after a short discussion between the two researchers. A slightly higher level of disagreement occurred initially between the follow up interview data themes but were clarified after a brief discussion.

Secondly, validity was checked for separate interviews using respondent validation techniques (Patton, 2002). The researcher made contact with all participants via phone to discuss the accuracy of the data analysis procedure and their satisfaction with the truthfulness of the constructs which emerged. This member checking exercise involved the participants answering a sample of verification and clarification questions which aimed to provide further depth to the data that was already created and reduce ambiguity (Lincoln & Guba, 1985).

Results

Part One: Visual Inspection of Data (following guidelines recommended by Hryacaiko and Martin, 1996). This part of the results section will present a summary of each participants weekly performance measure score throughout both baseline and intervention phases and their diary log data.

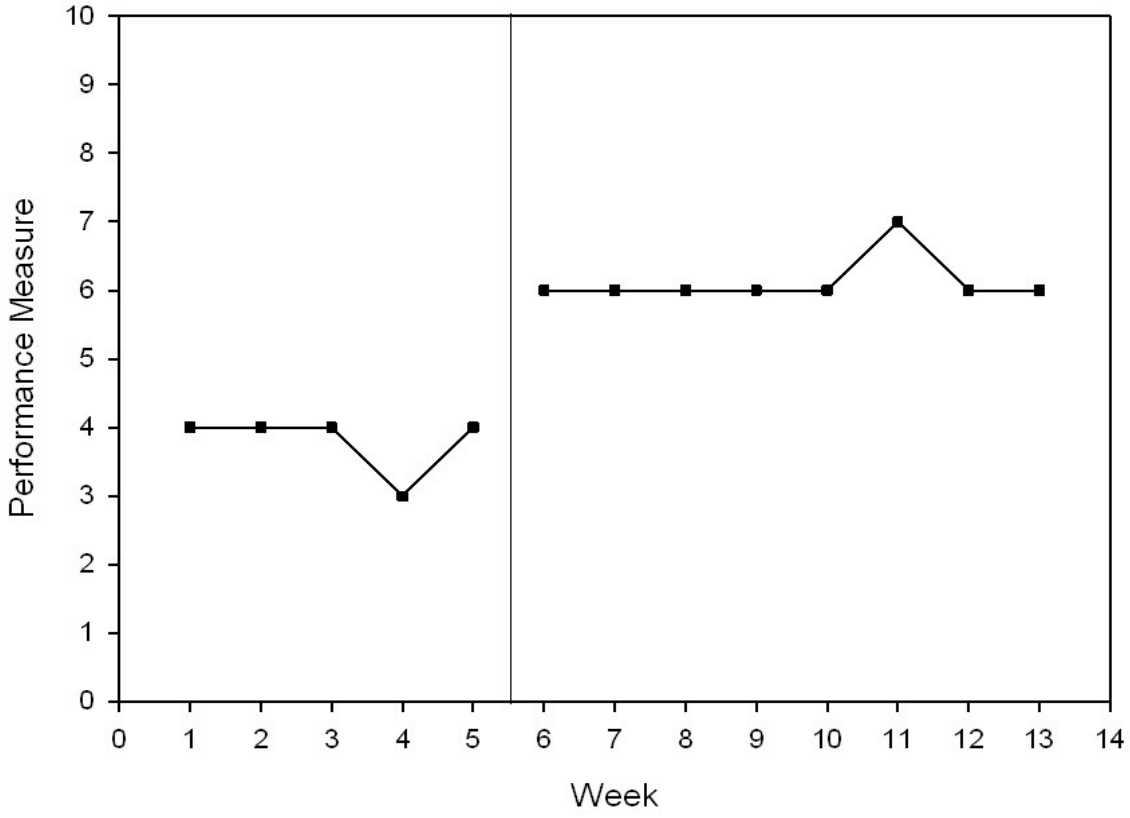

Figure 6.3 Participant One Weekly Performance Measure Scores

A reasonably stable baseline and prompt improvement in performance during the intervention stage was experienced by participant one (see figure 6.3). No overlapping data points across the two phases support the effectiveness of the intervention in enhancing putting performance. A consistent improvement in putting accuracy was evident compared to baseline data across all eight weeks of the intervention. Mean baseline and intervention measures were 3.8 and 6.1. The size of effect for participant one was the largest of the five participants in the study with a 61% improvement between mean baseline and intervention performance measures.

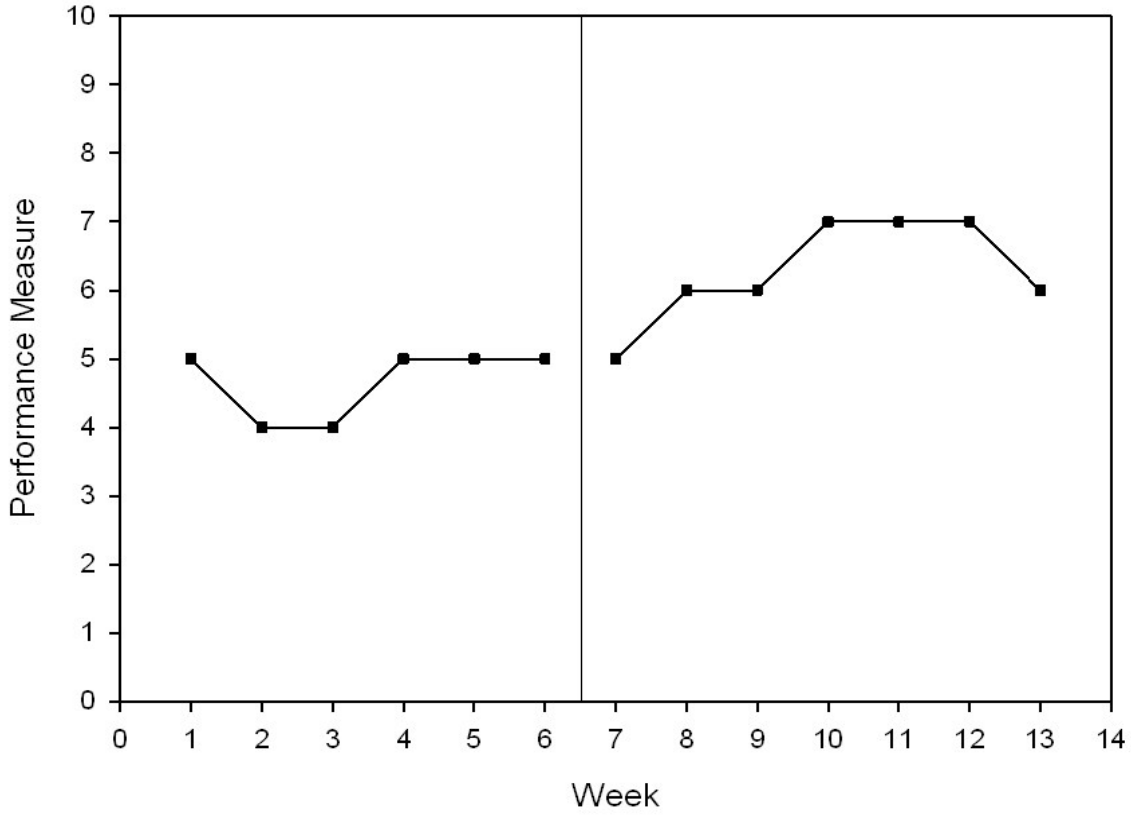

Figure 6.4 Participant Two Weekly Performance Measure Scores

Participant two encountered a relatively stable baseline and one overlapping data point during the first week of intervention (see figure 6.4). Putting success increased gradually between weeks seven and ten although performance plateaued during the final four weeks of the study. Mean baseline and intervention measures were 4.7 and 6.3 and the size of effect for participant two was reasonably large with a 34% improvement between mean baseline and intervention performance measures.

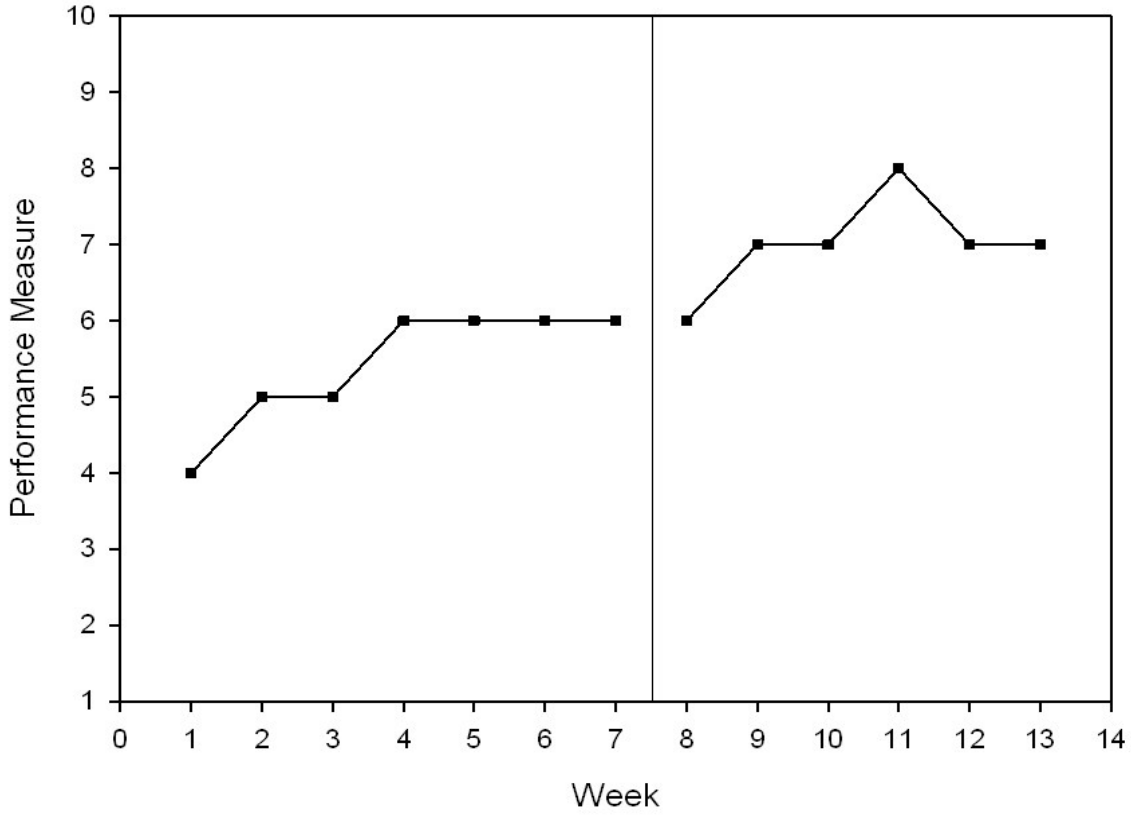

Figure 6.5 Participant Three Weekly Performance Measure Scores

A stable baseline was experienced during week's four to seven and similar to participant two, only one cross-over data point was sustained throughout baseline and intervention which provide partial support for the efficacy of the intervention (see figure 6.5). The mean intervention score of seven was the largest of all participants in the study and the score of eight obtained during week 11 was the highest individual score throughout the entire study. A slight decrease in performance during the final two weeks of intervention was evident but no overlap with baseline data occurred. Mean baseline and intervention measures were 5.4 and 7 and the size of effect for participant three was moderate with a 30% improvement between mean baseline and intervention performance measures.

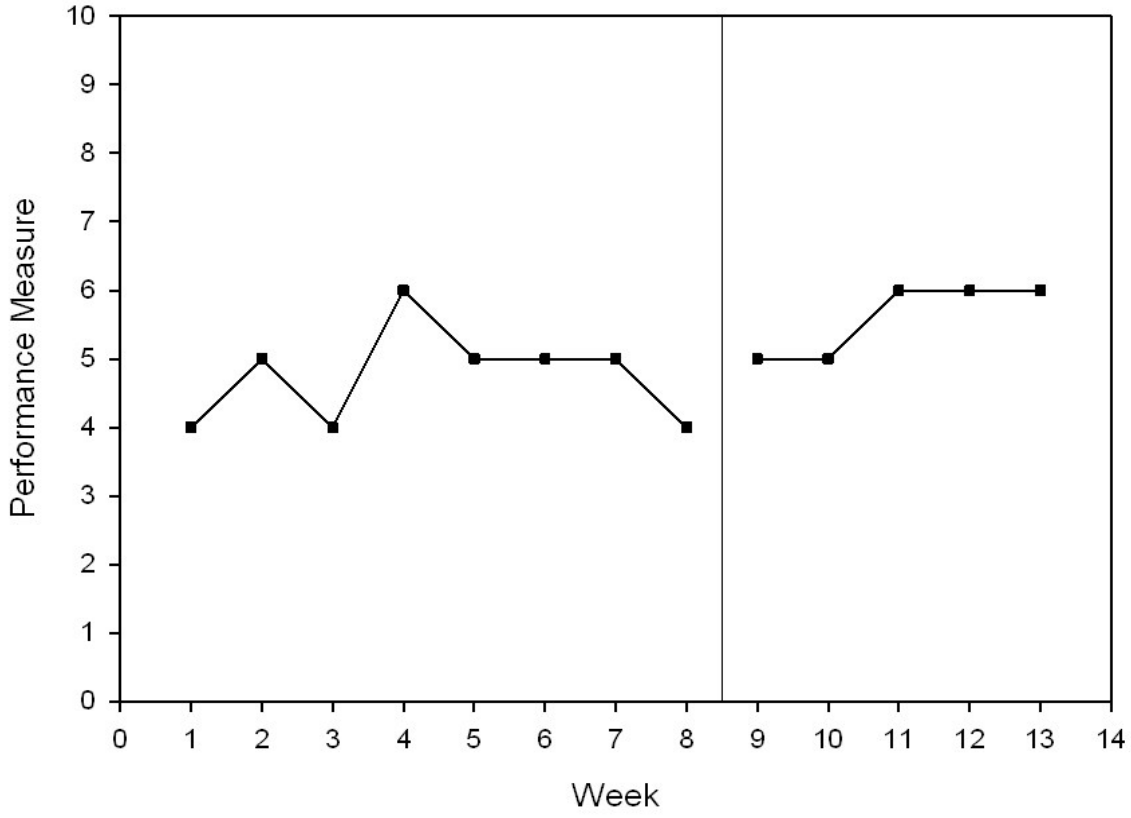

Figure 6.6 Participant Four Weekly Performance Measure Scores

Baseline data for participant four were initially unstable but stabilized during week's five to eight (see figure 6.6). Weekly performance measures did not improve after exposure to the intervention and whilst performance levels became more consistent during the final three weeks of the intervention, there was a crossover of data points between baseline and intervention data on five occasions. Mean baseline and intervention measures were 4.7 and 5.6 and the size of effect for participant four was relatively weak with a 19% improvement identified between mean baseline and intervention performance measures.

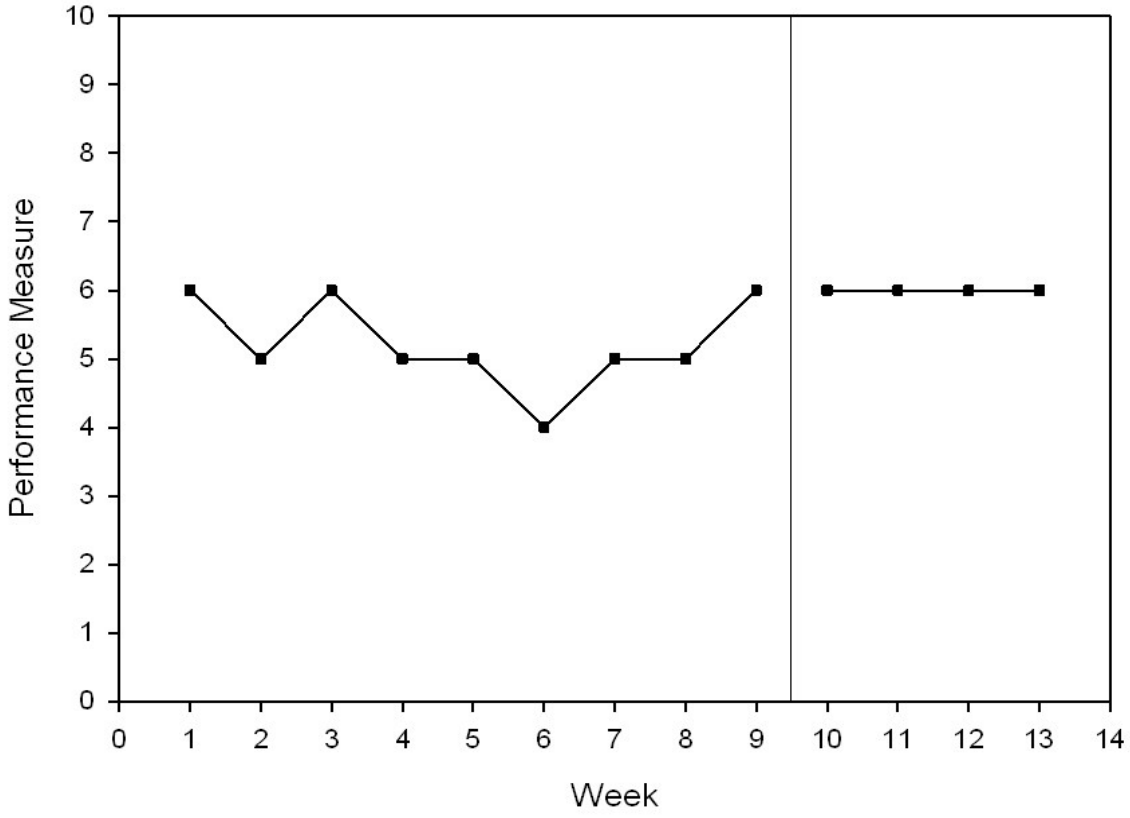

Figure 6.7 Participant Five Weekly Performance Measure Scores

Baseline data for participant five were relatively stable but showed gradual reductions in putting performance during week's four to eight in comparison to weeks one, two and three (see figure 6.7). Performance during the intervention stage was consistent although no improvements in putting scores were evident when compared to baseline. Participant five encountered four overlapping data points which suggests the impact of the intervention upon performance was low. Mean baseline and intervention measures were 5.2 and 6 and the size of effect was low with a 15% improvement between mean baseline and intervention performance measures.

Table 6.2

Mean (SD) Baseline and Intervention Performance Measure Scores (0-10) and Percentage Differences.

Participant	Baseline Score	Intervention	% Difference +/-
1	3.8 (0.45)	6.1 (0.35)	61% +
2	4.7 (0.52)	6.3 (0.76)	34% +
3	5.4 (0.79)	7 (0.63)	30% +
4	4.7 (0.71)	5.6 (0.55)	19% +
5	5.2 (0.67)	6 (0)	15% +
Grand Mean	4.8 (0.62)	6.2 (0.51)	31.8 (18.08)

Summary of Performance Measures

Performance data during the final four weeks of baseline were reasonably stable for all five participants. Participant three obtained a score of six on all four occasions, whilst the other four participants obtained the same score on three out of four occasions with the other measure being one less each time**.** Replication of the treatment effect occurred for three of the five participants. Clear performance improvements during intervention were evident for participants one, two and three which ranged in size from large (participant one) to relatively large (participants two and three). Participants four and five provide partial support for a replication effect and highlight how improvements in consistency of performance occurred during the intervention phase of the study.

In accord with the guidelines presented for the visual analysis of single subject design data across multiple baselines (Hrycaiko & Martin, 1996), there was partial support for the role of deliberate practice as a strategy for improving the short game putting performance of aspiring elite adolescent golfers who had no prior experience of undertaking and specialised golf specific training regimes. The findings of participants one, two and three were reasonably similar with few overlapping data points and improvements in performance measure scores. The findings of participants four and five were characterised by a number overlapping data points and smaller improvements in performance.

Self-Report Diary Log Measures

Analysis of self-report diary log data revealed adherence levels to prescribed training protocols were extremely high with 116 out of the 120 (97 percent) prescribed deliberate practice drills completed. Participant four was unable to complete any of the four prescribed practice drills during week 12 of the study due to illness although he was able to complete the weekly performance measure. The grand mean subjective ratings for physical and mental effort and fun were 9.1 (SD = 1.04), 9.1 (SD = 0.98) and 9.3 (SD = 0.85) which implies how participants enjoyed undertaking the drills yet also invested considerable amounts of physical and mental effort into every prescribed practice drill.

Part Two: Statistical Analysis

In order to determine if the deliberate practice intervention did promote genuine change and had a significant influence on the putting performances of the sample, the mean weekly performance measure scores were calculated for each participant for the baseline and intervention phases and a related t-test was used to compare the separate

data sets. This analysis revealed how mean performance was significantly higher (t_4 = 6.94, p = .002, d = 3.12) in the intervention phase (M = 6.20, SD = 0.51) than the baseline phase (M = 4.64, SD = 0.57) and the effect size was large.

Part Three: Qualitative Analysis

Social Validation Interviews

The results of the data analysis yielded eight sub-ordinate themes that were subsequently grouped into the following three super-ordinate themes: Psychological Benefits of Intervention, Technical Benefits of Intervention and Negative Perceptions of Intervention. The super-ordinate themes are presented in Table 6.3 along with exemplar quotes that illustrate particular concepts.

Psychological Benefits of Intervention

Motives to Practice

Participants discussed how they enjoyed undertaking the intervention and it helped to increase their motivation to practice which had generally been low throughout the past year as they preferred to play competitive rounds with peers. This finding is emphasised by participant one who said.

> *"I have never been a practicer really and do just lots of game time but I really liked the practice I was set and I will defiantly do more of it in the future as it seems to have had some benefit already on my performances and my motivation to golf such as wanting to become better and practice more and improve my quality of practice."*

Table 6.3

Master Table of Super-ordinate and Sub-ordinate Themes from Social Validation Interviews.

Super-ordinate Theme	Sub-ordinate Theme	Exemplar Quote
Psychological Benefits of Intervention	Motives to Practice	*"It was really enjoyable because after I did the first week I had something to beat and I was determined to beat it each week as I always enjoy competitiveness and competing against myself."*
	Self-Efficacy	*"It (deliberate practice) has given me loads more confidence on the little putts as you are practicing from 3 and 6 foot but also up to 30 foot which makes the smaller ones seem easier really."*
	Increased usage of Mental Skills	*"from now on my practice will be hard specific drills whereas before it would just be like playing games and having fun, but now it will become much more focussed, with more concentration and effort."*
	Long Term Commitment to Deliberate Practice	*"well I feel I have benefited a lot from the practice with my putting so I'm defiantly going to do deliberate practice with other areas of my game also to see if they improve as well like chipping and pitching and my driving as well because I have always struggled hitting fairways all through my career to date and I am sure this practice will help."*
Technical Benefits of Intervention	Stroke Play	*"I feel that my stroke has come on a lot and the greens are not great at the moment where I have been playing but the ball still seems to be rolling perfectly so I am looking forward to the season."*
	Shot Shaping	*"my shot shaping seems a lot better and this is going to be beneficial because in the summer the greens are going to be good so I will be able to trust my roll."*
Negative Perceptions of Intervention	Poorly Maintained Greens	*"I suppose it was quite difficult on the putting green because it has been quite wet and it is bobbly and it was not easy and it would've been easier on better greens."*
	Poor Weather Conditions	*"I did it (deliberate practice) in the rain a couple of times which was not the greatest."*

Participant two explained how the intervention was beneficial for him to undertake.

> *"this was something really different but useful for me to get better and it was so much harder doing that than playing nine holes with my mates. This is the best block of training I have ever done and I actually really liked doing it and it has sort of made me realise I can be really good at this game if I work hard enough."*

Increased Self-Efficacy

The intervention appears to have elevated the short game specific self-efficacy levels of participants. For example, participant one said.

> *"I have never been the best with my short game but sometimes when I was on a roll in the practice I was just putting balls for fun really and this is just great for me as I am a real confidence player."*

Additional support for the role of the intervention in enhancing self-efficacy levels for putting was provided by participant three who stated how he.

> *"liked the drills as they made me realise I am actually a good short game player although I never believed it and what my dad used to say that I am good is right really."*

Similarly, participant five stated how he.

> *"found the practice really helpful in getting over my short game issues which have always let me down in the past but I can do it when I put my mind to it and I will make sure I do it on the greens in the summer."*

Increased usage of Mental Skills

The intervention appears to have provoked an increased usage of mental skills such as concentration and goal setting within prescribed practice drills. For example, participant two said.

"we learn these mental things in class about psychology and Foxy (lecturer) always says to use them but I never used them really but I did in the drills as they were hard and I thought they would help and I took my time and went through my routines that I have and it seemed to have been good for my performance."

Participant three explained how he used goal setting throughout the intervention phase of the study.

"I liked setting a target after each practice session to try and beat the score I got next time."

Participant four discussed how he used mental skills during his drills by explaining.

"on the long shots you need to be in the right zone and I used my imagery from county training last year to just help me and it did pretty much all the time."

The challenging nature of the deliberate practice drills appears to have stimulated an upsurge in the levels of mental effort the participants placed into their normal practice routines. For example, participant one said.

"*the drill was hard and needed really focussing on which I liked as I do not really do this at all normally in practice or in my matches."*

Participant four also stated how he.

"practiced the hardest I have ever trained in my golf career this last few weeks and I actually liked it more than playing in the competitions and the stuff we usually do with the coaches."

Further evidence for how increased mental effort was used throughout the intervention was provided by participant five who said.

"I liked the hard aspect mentally as it made me feel good about my performance when I was done and when we were doing the weekly tests I was just so on it with my mental side."

Long Term Commitment to Deliberate Practice

The majority of participants revealed how they would commit long term to golf specific deliberate practice in the future with a particular emphasis on improving their short game performance levels. For example, participant two said.

"this is so different to what I normally do but I am sticking with it because it will get me to where I want to be in a few more years time once I have finished college."

Participant three also stated how he will undertake more practice in the future.

"I just love playing the game and will do all the tours for college next year but also spend more time practicing on my game but more so putting."

Participant five also discussed how he saw the benefits of committing long term to deliberate practice.

"*I found the drills hard to do but the more I do them the better I will be and this time next year I will be knocking the ball in from all round the greens for fun.*"

Technical Benefits of Intervention

Stroke Play

There was evidence to suggest how participants thought the intervention was beneficial for their technical putting skills. Participant one for example stated.

"*my stroke play is better but I just think how many times I have played that drill and similar shots since the start of term. It is a lot but it really has made it better."*

Participant four also stated.

> "*having to do this practice has been good for my stroke which has always been up and down as a kid really and I have always been aware that it needs to be worked on."*

Shot Shaping

Participant three explained how the intervention improved his shot shaping with the following quote.

> *"my shape has become so much better with all the time spent doing your drills and even my dad said so when I played on Sunday with him and my uncle."*

Negative Perceptions of Intervention

Poorly Maintained Greens

Selected participants discussed how the poor standard of the greens upon which they had to use for practicing were detrimental to their performance during the intervention. To illustrate, participant two said.

> "*the greens were up and down a bit when it was hot for a bit a few weeks ago and all the other lads on golf were on the putting area all the time practicing and they became pretty uneven which didn't help.*"

Poor Weather Conditions

A few of the participants discussed how poor weather conditions had a negative influence on the standard of their performance throughout the intervention. To demonstrate, participant two said.

> "*the weather has been ok at the start but at the end it was windy and wet so not ideal really.*"

Additionally, participant five stated the following.

"*I don't like practicing that much but it is seven worse in the rain and I really don't like it standing there wet and cold."*

Five Month Follow-up Interviews

Analysis of follow up interview data generated two super-ordinate and six sub-ordinate themes (see table 6.4). Exemplar quotations are also presented to illustrate particular concepts that emerged from the study.

Strategic Approach to Practice

Allegiance to Short Game Deliberate Practice

Prior to the intervention, participants were typically prescribed generic practice sessions of 60-90 minutes in duration by parents and institutional coaches that focussed on more than one facet of the game, involved large amounts of course play and did not require a large amount of effort to complete. For example, participant two said.

"*my golf routine was just practicing on the course really, nine holes in the morning and nine in the afternoon during the holidays and summer and hardly anything in the winter except for the games for my club.*"

Participant three also stated how he.

"*always used to just do what my mates at college did really which was always a bit of a laugh really more than practicing*."

Alternatively, they have now started to use the expertise of coaches based at the institution for guidance to develop creative yet mentally and physically challenging drills that are tailored towards fostering improvements in performance, with a particular focus placed on short game. For example, participant four said.

"*I ask Scott (Coach at Institution) if the practice I am doing is right for me and he gives me some advice like add a bit more distance to the shots or*

make it a bit harder by setting some goals but I have started to see for myself what I need to start working on."

Participants also reported undertaking larger volumes of practice each week than ever before. The following quote by participant one illustrates this point.

"this (new training regime) is massively different to my old training ways and I do so much more of it now and especially on the greens here at Myerscough."

Participant three also emphasised the point in the following statement.

"I have spent much more time recently on the greens instead of travelling around and playing on the college tours and if you would have asked me that at the start of the year I would have laughed as I was just play play all the time thinking this was the only way to improve."

Participant five also discussed how his recent training regime had changed.

"my approach to golf has just started to change really and I am training like I should be now and not like I used to which was easy for me but I knew I could have done more but that is me as I can be lazy with most things."

Exposure to challenging, high quality short game practice also coincided with increased short game skill development and self-initiated behaviours. Participants started to become receptive of the new deliberate practice regimes and positive in their outlook as they had started to see benefits in relation to short game skill improvement. The following quotes emphasise the nature of their new training environments.

"I now use lots of putting practices instead of just moping around the putting green and hitting random shots." (P1)

Table 6.4

Master Table of Super and Sub-ordinate Themes from Follow Up Interviews.

Super-ordinate Theme	Sub-ordinate Theme	Exemplar Quote
Strategic Approach to Practice	Allegiance to Short Game Deliberate Practice	*"I never used to focus on my short game properly and I would just make a few putts and then go and hit some balls but now I spend a good couple of hours a week on the putting green doing specific practice like 8 feet around the world, I do this for about one hour or until I hole at least seven out of ten or I will do three feet around the world or do thirty feet putts to a one foot radius of the hole so it is all much more specific. I have kind of realised that I have to do a lot more short game practice if I am going to do well in competition at the highest level."*
	Long Term Commitment to Deliberate Practice	*"you feel that if you keep on doing this form of practice you will continue to get better and better so I just kept on at it really, just digging away at it and this is what I need to do from now on. Deep down I know it is doing me the world of good and I suppose anything can get boring after a while but you just have to stick at it"*
	Significance of Deliberate Practice in Pursuit of Excellence	*"It has made me open my eyes a bit really in terms of approach needed to become a very good golfer and made me realise how you have to be prepared to put the hard work in especially on your short game."*
	Considered use of Resources	*"well the coaches at (institution) are always there if you need them and they ask how you are doing and what you are doing and we send emails to each other which again ask how things are going with practice. I think they are not trying to pressure you into doing it but they like to know what you are doing and it makes you do it also."*
Improved Psychological Approach to Golf	Promotion of Critical Self-Reflection	*"I have learned a lot about myself as a player, person and all areas of the game. I thought I knew a lot but I didn't really until I started doing this type of practice."*
	Psychological Benefits of Deliberate Practice	*"I am so much more confident now in my game, especially my putting which is really new for me and my mates and dad have also said this which has been great for my motivation also."*

"last year I never practiced putting and this was the weakest point of my game and now it is probably moving towards being my strongest." (P4)

"I have been doing lots of the putting practice that I did for you earlier in the year and I seem to now putt much more putts in the ten to fifteen foot range now as this is where I was really struggling." (P5)

They seem positive in their outlook as developing adolescent golfers and have started to see the long term benefits this strategy to practicing may provide in relation to their overall performance and especially short game skill improvement. This is emphasised in the following quotes.

"It (deliberate practice) has improved my game, especially my short game. The putting drills that came out of the tests have really helped me and I do them all the time now in my practice." (P3)

"before I did the intervention I struggled getting my putts to the hole and with doing the practice my technique has got better so I am much more positive with the putts and I am now getting the ball consistently past the hole which means if they miss it is still a positive." (P4)

Overall, participants appear to be have realised how undertaking deliberate practice may have a decisive role to play in their on-going development as aspiring golfers. Exposure with challenging, highly effortful (both mentally and physically) short game practice regimes also coincided with increased self-initiated practice behaviours.

Long Term Commitment to Deliberate Practice

The modified approach to practicing has provoked a change in life balance perspective between pursuit of adolescent golfing excellence and involvement in various

extracurricular activities and leisure pursuits that were commonplace prior to the intervention. For example, participant one said.

> *"I have started to live a bit like a golfer who wants to become a professional should be doing. I have started to put the work in on the greens now when I wouldn't have done so in the past but this really matters and I do not want to think what if in a few years."*

The majority of the sample post intervention possessed a greater confidence in their golf ability, especially short game focussed, and they discussed how they are striving more than ever to successfully bridge the transition from aspirant to elite adolescent then senior level golfer through long term engagement with deliberate practice. The two extracts below emphasise how participants view long term commitment to deliberate practice as central in their quest for excellence.

> *"before I came to college I used to just go with my mates and play holes and go home then have a putting competition and go home but I want to make a living out of it and to do that you need to go to the extreme really and practice hard."* (P1)

> *"I have concentrated much more just on golf this last few months than ever before and I have realised I am a better golfer than I thought I was and I have surprised myself just how much more work I have started to now put into my game."* (P4)

After short term exposure to deliberate practice, participants started to enjoy the nature of the practice more and observable improvements in weekly testing protocols were evident. To sum up, they quickly realised how long term engagement within deliberate practice was needed within the content of their ongoing day to day golf provision if they were to succeed in their goal of achieving senior level golfing excellence. The following quotes emphasise the mindset of selected participants.

"the pro at my club has been telling me I need to do this hard practice for months now and even showed me some drills to do but I was not so bothered as my handicap was coming down anyway but if I do this as well then it might come down more in the future." (P2)

"sometimes with the family, my mum cannot always take me to the golf club and I can't always rely on my dad who works shifts so it is hard to get there sometimes but I just think I need to get there and do the practice so I do." (P4)

"I'm going to do much more (deliberate practice) from now on and I will try to plan out ahead a lot more regards when I will practice and what I will practice instead of just going from event to event." (P5)

Significance of Deliberate Practice in Pursuit of Excellence

Undertaking deliberate practice activities was found to guarantee an intensity and focus that was never previously evident in the daily practice regimes of participants. For example, the following quotes were provided by two participants.

"whenever I do my practice now I always set myself hard tasks that make me work hard and focus as I do not see the point anymore of going onto a putting green for example and just putting holes." (P3)

All participants discussed their allegiance to long term deliberate practice and the realisation that such provision has a key function to play in both fulfilling their potential and facilitating their pursuit of golfing excellence. A number of participants were also initially wary of the new practice regime and found it to be tedious, but they soon realised its long-term significance once the intervention commenced. Examples of this way of thinking are provided below.

"*I did not think much of it to be honest when I started it because it was not really my kind of thing but it grew on me and I am really glad I did it because it helped me so much with my game."* (P2)

"I think the whole meaning of what we did with the putting practice and setting goals is the best thing that has happened to me as a golfer." (P3)

"I was a bit like what is this all about at the start but I gave it a go and it has really grown on me and I even do it sometimes in the morning on my own now before classes start." (P4)

Participants were found to have taken increased accountability for designing the content of daily practice activities and used creativity and initiative to devise appropriate regimes that were defined as deliberate practice.

"the sessions are mainly based on my weaknesses like my distance from 20-30 feet out as my really short stuff is ok and I use all sorts of targets to help me and Ronnie (coach at institution) has shown me how I can make it harder by adding in a few rules." (P2)

"I have also started doing more than one putt to each hole so say three putts from each station and say if I get two out of the three I allow myself to move on." (P3)

"with a little help from coaches (at institution), I set certain targets for certain aspects of my game like the eight foot round the world. I may set a target of six or more each week for the next month and if I beat it great but if not I have to learn from the experience and do extra practice." (P4)

Participants appear to becoming increasingly autonomous and self-directed in terms of their golf development. They no longer rely solely on prescribed practice schedules from qualified coaches or parents and only seek guidance and advise when they deem it to be necessary. For example, participant one stated.

"*I like having free reign over my golf and I still speak with Craig (coach at institution) and have the odd lesson and ring dad or see him at the weekends for what he thinks but its more what I think which I guess is important because they cannot play my shots for me."*

However, the culture in which they are developing remains inclusive in that support and guidance is available from coaches and parents when they feel it is appropriate. Participant five provided an example of this developmental landscape.

"I mean I have discussed what I am doing now with my dad and coach at home and they say it is good and suggest I just keep on working hard each day in practice which what I will do."

The apparent increases in self-regulated behaviours, coupled with the belief how professionalism at all times is a minimum requirement that must be evident in every practice session, was also epitomised by the following statement

"I set the structure of my practice now as I know what I need to work on and I behave much more professional in everything I do now, especially the way I practice." (P3)

Considered Use of Resources

As AASE students, all participants had access to a range of resources that are designed to aid the development of aspiring elite adolescent golfers. In the weeks leading up to the intervention, participants did not always make full use of the available amenities at the Institution. For example, participant one said.

"the first few weeks were all about settling in and going out and having all the trails for the teams and I did not use any of the facilities."

Following participation in the study which required them to undertake some prescribed drills in their own time, they started to take greater advantage of the excellent facilities and coaching expertise they had available. A particular emphasis was made towards the

short game specific resources which they recognized as instrumental in their continuing development as aspiring elite adolescent golfers. For example, participant three said.

> "*there are not many good short game areas in the north west and the ones here are underused really and top standard so I am so lucky that I can spent time whenever really using them in the day when I have no lessons and at weekend. Sometimes my best mate from home comes up at the weekend to practice with me here because the facilities are so good."*

The quotes below further symbolize how participants have started to take greater advantage in recent months of the outstanding facilities and coaching expertise at their disposal.

> "*here at Myerscough, we have all the facilities you can ever need so nothing should stop you improving and I am going to use the practice facilities all the time from now on." (P1)*
>
> *"I mean the putting green here is really good as it is big and you can do lots of short and long range putting practice which is vital*." (P2)

Improved Psychological Approach to Golf

Promotion of Critical Self-Reflection

Participants discussed in their interviews how undertaking regular deliberate practice has aided them to underline their current strengths and weaknesses in terms of overall capability as a golfer. For example participant three said.

> *"if you want to identify your weaknesses and strengthen them then the best way to do this is through using these types of practices."*

Also participant four stated how undertaking deliberate practice has helped him to identify the strengths and weaknesses with his present game.

> *"deliberate practice tells you the truth and you cannot hide from it. If you are playing badly it will show up but I think this is good because it makes*

you aware of what you are doing well and also where you need to spend time working."

Selected participants also started to undertake post practice reflections over the course of the past five months in which they examine and evaluate the standard of practice they undertake through completion of a reflective diary blog. They also adopt this approach with all competitive matches they play in for the college, home club and county representative teams. Out of the five participants, three discussed how deliberate practice encourages them to self-evaluate and critically appraise the standard of daily golf performances more than ever before. Involvement in the intervention has also fostered self-reliance, autonomy and heightened awareness of the antecedents believed integral for achieving and maintaining golfing excellence. To illustrate, participant one stated.

"*I have grown up as a golfer and a student really since I came here and I now act like I should have done two years ago. I think this new approach to golf has helped this and even my mum has noticed it when I go home some weekends and I am always out of the house practicing my golf or doing my reflection portfolio for class.*"

In another example of increased self-reflection, participant three said.

"*I have a list on my wall which shows my best and worst parts of my game and I want to scribble out all the weaknesses as soon as possible and add more strengths.*"

Participants were also slightly critical towards the path they followed through their childhood and early teenage years. For example, they discussed how the simplicity of practice regimes undertaken prior to intervention tended to generate a false sense of confidence. To illustrate, participant one stated how.

"*I just played my course at home all the time and knew it back to front and where every bunker and fairway was but I was not that great really on any other courses. It was great at the time as I was the best junior in the club but really when I look at it now I was not progressing.*"

Participant four also provided the following statement which captures the essence of this concept particularly well.

"*I always used to play against the younger kids which was easy really as I could hit if longer and I always won but I think I would have been much better playing my dad and his mates more and losing but having to try harder.*"

Overall, golf activities during childhood and early teenage years was undertaken in a relaxed manner mainly at the home club and a driving range with lots of ball striking but no consequences, specific aims, targets or reflections and too much emphasis on thinking technically. Participants did not put the blame elsewhere when they faced adversity, were honest and self-critical in their recent practice and competition performances and committed to long term change in practice behaviour and competition schedules. For example, participant one said.

"*I will only play the tour events at college when I feel it is important for me like before county matches and I will go away and put the effort in over the winter instead of playing winter tees and come back a much better player.*"

They also stressed how engaging with deliberate practice has made them increasingly aware of the arduous journey they faced in securing elite senior level golfing excellence status. For example, participant three stated.

"*I'm a good player but nowhere where I thought I was really. I found the drills so hard at the start but I got better and my test results were good and*

this is what I need to stick doing if I am going to become a tour player as I do not want to be just a club professional."

Psychological Benefits of Deliberate Practice

Increases in the participants self-discipline and conviction towards golf development have replaced the previous dependency placed upon coaches and they appear to be self-determined in sustaining motivation towards the new approach to practicing. The following extract was provided by participant three.

"what I have learned through training this way is that you must have patience with golf and it is not about looking a couple of months into the future but six or seven years into your career."

There is no doubt that exposure to a complex, demanding and challenging learning environment was advantageous for the refinement of numerous mental skills including goal setting and imagery. For example, participant one said.

"*I use all the psychology that Craig and Ronnie (coaches at institution) tell us about in my practice and games now which I never did but I have given it a good go and use the goal setting and imagery stuff all the time now.*"

Participant four also provided insight into the role psychology has started to take for him in his golf development.

"*the short game drills I do are really good for doping my pre shot routine which is really just lots of imagery and I go through it before every shot now because psychology is so important on tour and you can see from the telly how the players do it.*"

All participants discussed how both their attitudes and time dedicated towards the psychological aspects of golf have altered as a result of undertaking deliberate practice. The following quotes provide support for this assertion.

"I think that mentally I have improved and I have become much more in control of my anger during my practice and competitions." (P3)

"I always stick to and keep doing my pre shot routine now as this helps me stay focussed at all times." (P4)

Participant five provided the following comment which highlights how he spends much more time working on and implementing his mental game into practice now than he did five months ago.

"I have been really working on the mental side of the game and how I deal with and manage myself on the course and trying to stop thinking about other things whilst playing."

Participant three discussed how dedicating time for setting goals proved beneficial in facilitating both enjoyment of practice and confidence in ability.

"as long as you set yourself goals on all the different tasks it cannot be enjoyable because you just want to beat your score from last time and this is great for confidence."

These quotes demonstrate clearly how the participants acknowledge the role that psychology has to play in their continued golf development and how practicing deliberately has instigated an upsurge in usage of mental skills including imagery and pre shot routines.

Discussion

The primary aim of study four was to determine if the introduction of a deliberate practice intervention improved the golf putting performance of aspiring elite adolescent golfers who had no prior experience of specialised golf practice regimes and to obtain insights into participant experiences through social validation interviews. The secondary aim was to undertake five month follow up interviews with all participants to establish their habitual practice routines after exposure to a golf specific deliberate practice intervention for the first time and to detect if any adjustments were made to practice behaviours and their approach to golf development.

In agreement with the predictions of Ericsson et al., (1993), the findings of this study lend support to the role of deliberate practice as an effective strategy for increasing the putting performance of aspiring elite adolescent golfers. Visual inspection and a descriptive overview of data revealed the largest improvements in performance were experienced by participants one and two. The intervention also enabled the other three participants to achieve at least small improvements in putting performance over the duration of the study. Throughout the intervention period, weekly performance measures of participants one, two and three remained above the levels obtained at baseline and improvements in putting performance from baseline to intervention ranged from substantial to moderate. The largest and smallest effects were experienced by participants one and five who achieved a 61 percent and 15 percent improvement in mean putting performance scores between baseline and intervention phases respectively. The introduction of the intervention also stabilised the performance measure scores for participants four and five during the intervention phases which is important as consistent scoring has implications for total tournament outcomes in elite golf

(Alexander & Kern, 2005). Statistical analysis of data also revealed how the deliberate practice intervention inflicted genuine change in putting performance as mean weekly performance measure scores were found to be significantly higher in the intervention phase than the baseline phase. Qualitative interviews revealed how participants enjoyed undertaking deliberate practice, experienced a range of psychological and technical improvements, adapted current training schedules to mirror such practice strategies and committed long term to activities of this nature.

The applicability of long term deliberate practice from early childhood to nurture excellence is common within physically demanding sports such as gymnastics where the ability to compete at world class levels of performance at young ages is paramount (e.g., Law et al., 2007). However, this study highlights how exposing aspiring elite adolescent golfers with golf specific deliberate practice for the first time at a relatively late stage of their development may also prove beneficial in the long term. The findings also provide support for the role of deliberate play as this was a path that was followed during the participants childhood and early teenage years and appears beneficial in developing the physical, technical, and psychological skills deemed necessary to successfully undertake specialised practice strategies in later adolescent life.

Themes which emerged from the social validation and follow up interviews emphasise how the intervention was generally well received by participants and had an influential impact on their long-term approach towards developing as golfers. In line with the predictions of self-determination theory (Duda, Chi, Newton, Walling, & Catley, 1995) the high task disposition undertaken by the participants post-intervention appears to have developed higher levels of intrinsic motivation towards golf. Indeed, since undertaking the study, participants become gradually more ambitious in terms of their

golf career aspirations since it become increasingly task focussed and central in their lives for the first time. The participants were also well aware how undertaking a altered approach to golf development has helped to initiate improvements in performance. Although very different from previous forms of golf provision undertaken, participants have persisted to undertake both short and long game golf specific deliberate practice because they have developed awareness for the beneficial role that this training strategy may play in securing excellence as both an adolescent and senior level golfer.

Participants also demonstrated a long-term commitment to golf specific deliberate practice regimes because they were confident how activities of this nature had an important role to play within their long-term developmental aspirations as golfers. This conforms to previous research which highlights how sports performers become increasingly committed and self-determined in their quest for excellence as they grew older (Côté et al., 2009; Jess et al., 2004; Schoon, 2000; Treasure, 2001). These finding also fit well with perceived competency motivational theory which suggests individuals are more likely to strive for excellence and dedicate the time needed to undertake the required training regimes to achieve this accolade in areas where they can demonstrate proficiency (Harter, 1981). Competence has also been revealed as an important predictor for participation and continuation in sport and research suggests that when participants develop higher levels of competence they are more likely remain engaged and adhere to those activities (Ryan & Deci, 2000).

Participants enjoyed undertaking the deliberate practice drills and the challenge involved in participating in the study and the requirement it placed on them to work on the very edge of their current capabilities. This finding links well with the recent

findings of Nicholls, Polman, and Levy (2012) which showed how challenge appraisal in competitive athletes is associated with positive emotions which resulted in the usage of more problem focussed coping strategies which is related to self-regulated learning (Zimmerman, 1986, 2002, 2006). Participants were also willing to devote time to undertaking the deliberate practice and displayed high levels of fun throughout which align with the findings of Helsen et al., (1998), Hodges and Starkes (1996), Starkes et al., (1996) and Van Rossum, (2000) but oppose the beliefs of Ericsson and colleagues who conceptualised deliberate practice as an activity that should not be inherently enjoyable or fun to undertake. The findings of this study also lend support to the sport commitment model (Scanlan et al., 1993) as enjoyment and effort levels exerted towards deliberate practice appeared to be positively related. The requirements of the intervention drill also stimulated the participants to increase their usage of golf specific mental skills, including imagery and pre shot routines in practice and performance environments, which are well accepted in the golf psychology literature as critical ingredients for golfing success (Cotterill et al., 2010; Hellstrom 2009; McCaffrey & Orlick, 1989; Smith & Holmes, 2004).

All participants were proactive participants within their own learning process over the previous five months and soon realised the importance of engaging in regular deliberate practice if they were to achieve their goal of becoming an elite senior level golfer. Therefore, a key message to emerge from the study was how deliberate practice may stimulate self-determined critical reflection (e.g., the capability to recognize and work on weaker aspects of their game), self-monitoring and independence of learning which have been shown to be essential for success at the elite levels of sport (Anshel, 1995; Cleary & Zimmerman, 2001; Jonker, Elferink-Gemser, & Visscher, 2010; Jonker, Elferink-Gemser, Toering, Lyons, & Visscher, 2010b; Toering, Elfering-Gemser,

Jordet, & Visscher, 2009). The participants also exerted greater levels of mental and physical effort into their daily golf activities and demonstrated greater responsibility for their own development since undertaking the intervention which further emphasises the self-regulated nature of their golf development over the past five months. Indeed, a shift in responsibility from significant others providing practice and competition guidance and structure in the early teenage years (e.g., parents, coaches) towards self-initiated and autonomous decision making behaviours post intervention was now evident.

Limitations

A limitation of this study relates to the lack of ecological validity as intervention effects were judged in a non-competitive instead of a competitive golf environment. The study also failed to distinguish if participants were engaging in any off course deliberate practice activities throughout the duration of the study and the nature and volume of any such schedules (e.g., physical fitness related protocols). Equally, although recollections from the social validation and follow up interviews revealed how the participants became increasingly self-regulated, reflective, confident and task orientated golfers after exposure with the intervention, the study failed to quantitatively measure any attitudinal or behavioural changes pre and post intervention. Therefore, and replicating the approach used by Thelwell and Greenlees (2003) who examined the effects of a mental skills training package on competitive tri-athlon performance, the participants in the present study may have completed psychometrics such as The Mental Skills Questionnaire (Bull, Albinson, & Shambrook, 1996) that comprises five subscales (imagery ability, mental preparation, concentration, self-confidence and arousal regulation) on a weekly basis. This study may have also replicated the approach used by Ram and McCullagh (2003) who examined the effectiveness of self-modelling on

volleyball performance and self-efficacy through a questionnaire based on guidelines proposed by Bandura (2001). For example, pre and post intervention self-efficacy measures for all participants may have been obtained for a series of questions such as "how confident from zero to ten are you that you will get a score of at least five in the weekly performance measure?"

Implications and Recommendations for Future Research

The key theoretical implication to emerge from this study is the finding that exposure with deliberate practice for the first time during late adolescence aided improvement in golf putting performances of aspiring elite adolescent golfers. This finding is in line with both Ericsson's (2003) and Côté's (1999) arguments that engagement in deliberate practice during late adolescence is important for achieving performance improvements that are necessary to ultimately achieve elite status. In addition, deliberate practice appears to have also contributed towards the development of self-regulatory skills, levels of intrinsic motivation, critical reflection and independence of learning of the aspiring elite golfers. This finding has significant applied practical importance in terms of how high performance golf development systems in the future are structured and may require golf coaches who work with aspiring elite golfers to challenge and refine their existing coaching philosophy, values and beliefs (Kidman, 2010) and current approaches (e.g. early specialisation instead of diversified approach) towards developing adolescent golfing excellence. Future SSD studies are also encouraged to examine the effects of deliberate practice upon other components golf instead of specialising on short game putting performance only (e.g., long game, pitching), although studies of this nature may prove difficult with highly skilled aspiring elite golfers who may already have a prescribed coaching schedule. In this scenario, a researcher would need to explain to the proposed participants and their coaching team

how the new training strategy differs from what they may have undertaken previously and the potential benefits this approach to practice may provide in the long term.

It is also important how talent development researchers recognise how statistical significance and practical meaningfulness portray two different things in SSD research (Barlow & Hersen, 1984). To elaborate, statistical significance refers to the probability that an intervention has a reliable effect on a dependent variable where as practical meaningfulness refers to the importance or practical value of the effect on future performance.

Conclusions

In conclusion, this study demonstrates the usefulness of a deliberate practice intervention for improving putting performance and in altering a long-term approach towards golf development. All participants demonstrated either a significant or more stable improvement in test performance and made a commitment to embed deliberate practice into on-going golf training schedules. The study also highlights the psychological and technical benefits that the deliberate practice framework may impose upon the developmental process of aspiring elite adolescent golfers. These conclusions combined with the theoretical and practical implications highlighted provide support to golf practitioners and policy makers who may wish to utilise golf specific deliberate practice with aspiring elite adolescent golfers for the first time during the mid-teenage years to increase the standard of their short game putting abilities.

CHAPTER 7

GENERAL DISCUSSION

Researchers have deliberated about how elite levels of performance across many human performance domains are achieved for decades (Ericsson et al., 2006). The theory of deliberate practice which emerged from the research undertaken by Ericsson and colleagues through retrospectively examining the practice trends of world class musicians has proposed how the attainment of expertise within any discipline is only possible after undertaking 10,000 hours or ten years of highly effortful, performance focussed and not inherently enjoyable practice regimes. This theory for developing expertise is unique because it has emphasised the significance of both quantity and quality of practice upon skill development which earlier theories within the motor learning literature had failed to consider. According to the theory, participants who accomplish both the greatest improvements and uppermost levels of performance will have accrued the largest amounts of deliberate practice throughout their careers. A further principle of the theory is the suggestion how those striving to achieve elite status remain in earlier stages of the learning process (e.g., cognitive and associative) as there is still a high level of cognitive activity required to refine skills.

The application of the deliberate practice framework has been examined in fields as diverse as sport (Helsen et al., 1998), teacher training (Dunn & Schriner, 1999) and music (Ericsson et al., 1993) over the past two decades. Collectively, the findings of these studies have revealed how a monotonic relationship exists between accumulated hours of deliberate practice and levels of performance. From within the sport specific literature, research has provided a comprehensive picture of how undertaking long term deliberate practice from a young age played a key role in acquiring senior level sporting

excellence in soccer, cricket, figure skating, field hockey and rhythmic gymnastics (Ford et al., 2009; Hodges & Starkes, 1996; Helsen et al., 1998; Law et al., 2007; Weissensteiner et al., 2008). However, whilst research across several sports has examined the participation and training patterns of elite level sports performers through the lens of deliberate practice theory, the application of the framework to golf had yet to be explored. Therefore, in response to this gap in the literature, the primary purpose of this thesis was determine the applicability of deliberate practice in developing male adolescent golfing excellence through a mixed methods approach. The main findings of the thesis will be discussed in relation to the research objectives set out in the introduction chapter (page 16).

The four specific objectives of this thesis were to:

1. Identify the types of golf activities undertaken by aspiring elite adolescent golfers over a nine month period and compare actual and recalled data.
2. Examine the developments and lived experiences of elite adolescent golfers.
3. Implement a deliberate practice intervention to aspiring elite adolescent golfers.
4. Determine the effects of a deliberate practice intervention upon performance and practice behaviours of aspiring elite adolescent golfers.

The primary aim of this general discussion chapter is to draw together and provide a critical evaluation of the key findings that arose from the four studies within the thesis in relation to the deliberate practice theoretical framework and extant literature. Comparisons are made between the paths travelled by elite and aspiring elite adolescent golfers and insight into the influence that deliberate practice activities may exert upon future practice behaviours is provided. Limitations of the research designs utilised are presented along with practical implications and ideas for future research projects. It is

hoped the findings of this thesis may deliver a timely contribution to the under researched golf expertise literature by providing players, coaches, applied sport psychologists and policy makers who are actively involved within golf talent development systems with stronger evidence to nurture exceptional adolescent golf performance in the future.

7.1 Originality of Thesis and Summary of Key Findings

The findings of the current thesis make several original contributions to the existing golf development literature. In summary, the studies utilised both aspiring elite and elite level adolescent golfers and novel methodological approaches which included the use of longitudinal diary logs, IPA and SSD to examine the applicability of ideas forwarded by Ericsson and Côté in relation to the development of adolescent golfing excellence. In summarising the main findings of the four studies, it was found that the model proposed by Côté and colleagues (2007) as a means of securing elite sporting status more closely resembled the nature of the developments encountered by all participants during their childhood and early adolescence.

Specifically, the results of study one highlighted the possible benefits that practicing deliberately within golf competitions and practice rounds may inflict upon the reduction of golf handicaps over a nine month period. It was also observed how retrospective recall was an accurate method to use when wishing to determine the volumes and intensities of golf activities carried out over the duration of the study. Based on these findings, it is proposed that the technique described will be helpful to researchers in order to advance knowledge regarding talent diagnostic and talent development research. Study two revealed how existing elite level adolescent golfers did not specialise early in golf and instead experienced a diversified introduction to several

sports, which included golf, within a playful, fun, non-competitive environment that resembled key tenets of deliberate play theory (Côte, 1999). A long term commitment to golf specific deliberate practice occurred during late adolescence once participants had specialised in golf and had started to compete regularly for county and international representative golf teams.

The third study highlighted how the participants experienced supportive parents, a diversified enjoyable introduction to sport followed by a self-determined commitment to golf in the mid teenage years and a strategic approach to developing excellence which recognised the important role that psychology had to play in improving performance post 16 years of age. The forth study revealed how a deliberate practice intervention improved either the standard or consistency of golf putting performance in addition positively influencing the practice behaviours of aspiring elite adolescent golfers who had no previous experience of undertaking specialised golf training protocols.

Collectively, the four studies reveal how long term deliberate practice was not a pre-requisite for ensuring the on-going improvement in golf performance throughout childhood and the early teenage years. However, the significance of this training strategy post 16 years as a method for progressively improving the golf performance of emerging and elite level adolescent golfers was well established. The following subsections will explain and critically compare the findings in more depth with what is currently known within the extant talent development in sport literature.

7.2 Development of Elite Adolescent Golfers

7.2.1 Deliberate Practice or Deliberate Play?

It is well accepted that success in sport depends on a participant undertaking long term deliberate practice (Ward et al., 2004). This line of thinking reveals how elite senior level sports performers have tended to spend large amounts of time from a young age undertaking deliberate practice activities when compared to lesser skilled individuals. As talent development in golf is an under researched area, study two was unique as it set out to explore significant milestones (e.g., at what ages did the participants specialise in golf) and longitudinal patterns of sporting activities undertaken by current elite level adolescent golfers (e.g., what sports and types of practice had they encountered during their lives to date). In order to establish their previous sports participation and practice trends (objective two), and compare such developments with the findings of study one, study two participants were purposefully sampled from several EGU representative squads. Despite its well documented drawbacks including the difficulty faced by participants in providing accurate insights into the micro structure of previous activities undertaken, a retrospective approach was considered an appropriate method to use in this study since it was only possible to identify elite adolescent golfers "after the fact" (Côté et al., 2005, p.15). Purposefully, the interview method was crafted in a manner that enabled specific probes and prompts to be used when necessary to encourage recall and reconstruct specific events that had occurred previously. Another unique aspect of this study was how it examined the role of deliberate practice theory in acquiring adolescent sporting excellence as the existing literature has focussed specifically on its role in acquiring excellence as a senior level competitor (e.g., Baker et al., 2003; 2005).

Compatible with the model proposed by Côté for developing sporting excellence, the suggestion that a non-competitive, fun and diversified introduction to several sports has

an important part to play in the development of adolescent golfing excellence were supported in study two. The major finding of this study suggests how engaging with golf specific deliberate practise activities was not a mandatory requirement for on-going golf performance improvements during childhood and early adolescence. Specifically, the study revealed how engagement within sustained, golf specific deliberate practice on an annual basis from an early age was not a necessary strategy for reaching a level of performance that secured selection for EGU adolescent representative golf squads. It was found that participants in this study did not follow an early specialisation path nor did they interact within any form of golf specific deliberate practice until they decided to focus solely on golf once the decision to try and achieve elite senior level golfer status became their primary goal in life at approximately 16 years of age. As a substitute, they encountered a playful introduction to several individual and team sports, which included golf in all cases, within participation focussed, enjoyable learning environments which were reminiscent of deliberate play activities, until selection for EGU international representative teams. These findings are similar to those of Baker et al., (2005) and Berry et al., (2008) which established how existing elite level sports performers from a range of sports including netball, basketball, swimming and triathlon also encountered a playful, non-competitive learning environment up to their mid-teenage years which seemed to aid in the development of both motor skills in preparation for the transition to specialised training in later adolescence and intrinsic motivation towards the participants primary sport.

Another key outcome from study two was how participation in recreational golf and occasional competitions for roughly ten years instead of a commitment to undertaking long term golf specific deliberate practice appears a suitable path to travel for achieving international selection as an adolescent golfer. This finding provides further evidence

against deliberate practice theory as a pre-requisite for achieving adolescent golfing excellence because highly skilled levels of adolescent golf performance were achieved without any exposure with specialised golf training protocols (e.g., handicap as low as zero). It is also important to consider the applicability of these findings to the theoretical underpinnings of deliberate practice theory as the participants in study two were classified as elite adolescent and not elite senior level golf performers. In short, Ericsson`s theory for acquiring excellence is centred on the understanding that 10,000 hours of highly effortful, performance focussed practice schedules are necessary to achieve expert status as a senior and not adolescent levels of excellence which was the case in this study (Ericsson et al., 1993).

When the daily practice activities undertaken by participants in study one are compared with the retrospective accounts of study two participants, it is apparent that there were notable differences in the nature of golf activities undertaken between the ages of 16-18. Participants in study one, who were lesser skilled to their elite counterparts in study two based on existing golf handicap scores, encountered a varied approach to practice and continued to compete within regular competitions and practice rounds. This approach was found to be beneficial for the continued reduction in golf handicap over the course of the nine month study. Alternatively, the participants in study two had all specialised in golf by the age of 16 and independently taken the decision to commit considerable amounts of time and effort into to their on-going development as golfers. For example, the number of competitions they competed within at both the national and international levels reduced sharply and practice became less diverse with a concerted focus placed upon undertaking short game specific deliberate practice activities. The findings also revealed how the largest reductions in golf handicap, post 16, were experienced by participants in study two who had committed solely to golf specific

specialised training regimes and encountered gradual and continued increments in the amount of time spent in deliberate practice per day since approximately 16 years of age. However, it is important to acknowledge how notable reductions in golf handicap were encountered by the some of the participants in study one although they practiced deliberately when playing shots on the course but had yet to commit fully to undertaking long term golf specific deliberate practice activities outside of the competitive arena and within a specialised practice environment.

In short, the findings of studies one and two demonstrated how long term golf specific deliberate practice was not a pre-requisite for achieving emerging elite (study one participants) and elite (study two participants) levels of adolescent golf performance. Notably though, the findings of study two acknowledge how this approach to golf development does have an important role to play in maintaining continued performance improvements once a participant approaches a handicap of zero and scope for notable improvements at this stage of the learning process diminishes. The findings of both studies also advocate how aspiring elite adolescent golfers may not need to undertake purely golf specific deliberate practice from an early age if they harbour aspirations of achieving elite adolescent golfing status. However, the findings underline the important role it may play in aiding continued performance improvements and the possibility of a successful transition from the elite adolescent to elite senior ranks of golf performance. This late specialisation approach resembles the findings of Côté and colleagues (Baker et al., 2003; Côté & Soberlack, 2003) which also revealed how elite senior level performers experienced a range of sports prior to specialising in their primary sport and committing long term to deliberate practice in late adolescence.

7.2.2 Lived Experiences of Elite Adolescent Golfers

Most studies which have explored the development of sporting excellence have been concerned with retrospectively determining amounts and types of sports and practices undertaken by existing elite level sports performers. For example, a key finding in study two related to the participants estimations and recollections of how they encountered fun, non-competitive learning environments in several sports throughout their childhoods and early teenage years prior to specialising in golf. However, this study utilised a quantitative methodology to explore the development of elite adolescent golf performance which may have been restrictive in terms of the depth of information obtained. As such, a novel approach within talent development in sport research was taken in study three whereby the lived experiences encountered by golfers as they travelled the path to adolescent excellence was determined through IPA (objective two). This method enabled the meanings that participants assigned to their own lived experiences of travelling the path to adolescent golfing excellence to be captured and explored. The logic behind using this approach which also makes an original contribution to the golf development literature was reinforced by Smith et al., (2009) who recommended that researchers should employ IPA to determine the lived experiences of significant life events of their participants which in this case was the achievement of securing status as an elite adolescent golfer.

Deliberate practice theory predicts that the higher a participants level of performance, the greater the amount of deliberate practice they will have encountered (Ericsson et al., 1993). This assumption has resulted in the tendency of practitioners to expose young, aspiring elite sports performers with specialised training regimes to accelerate their development and this approach to talent development is well documented in the literature. This was not found to be the case in study three as no participant encountered

any forms of golf specific deliberate practice until approximately 16 years of age. Instead, it was revealed how international adolescent status was preceded by a particularly enjoyable, participant directed, lengthy and well-rounded participation in various sporting activities up to the mid-teenage years. These findings also question the relevance of deliberate practice as a strategy for achieving adolescent golfing excellence and support the theory that deliberate play may have been an important contributor to adolescent golf expertise development.

A further key finding to emerge for this study was how all participants had a common interest and passion for several sports during their childhoods and yet had no aspirations of specialising early or striving for the top in any particular sport. This meant they did not experience any form of deliberate practice training throughout their childhood and early teenage years and remained actively involved in a range of individual and team based sports within a playful self-determined, non-competitive learning environment. These experiences of engaging with intrinsically motivating activities, such as deliberate play, during the early stages of their golf careers appears to have played a key role in ensuring the participants possessed the required enthusiasm to pursue more externally controlled, structured and demanding activities such as deliberate practice in their later adolescent years. Participants were also found to be highly driven in life, and especially from the mid-teenage years onwards, by the need to excel and demonstrate competence and it was aged approximately 16 when the participants identified golf as a pastime through which they may fulfil this requirement in the long term.

The seminal deliberate practice study by Ericsson et al., (1993) viewed high motivation levels as a pre-requisite for sustained engagement in deliberate practice over days, years, and even decades. They stressed how it was vital that an aspiring expert

remained highly motivated and committed to their ambition if they were to continue to dedicate the time and effort needed to undertake mundane deliberate practice regimes over a period of ten years and beyond. It was found that participants in study three were very much aware of, and motivated, to make the decisions and carry out the key steps that would need to be taken once they made the choice to specialise in golf. For example, participants were aware of what types of golf specific training they would need to start undertaking to improve their chances of making the transition from elite adolescent to senior levels of golfing excellence. Also, the participants never lacked the motivation to practice or play golf at any stage of their career and possessed a steadfast determination to succeed in the sport once they gained international adolescent selection through becoming a senior level touring professional in later life.

The late specialisation path followed by participants in studies two and three not only created successful performance outcomes such as success at the national or international level but also positive psychological responses which included high perceived ability, intrinsic motivational orientations and levels of golf enjoyment and satisfaction from the mid-adolescence years onwards. To illustrate, this pathway increased both perceptions of competence (Harter, 1978, 1981) which has important practical implications for maintaining (or even enhancing) the motivation required to undertake long term specialised golf training regimes and levels of intrinsic motivation which helped to promote a sustained investment and improvement in golf performance. Inadvertently, the introduction of deliberate practice into the participants day to day golf activities at a later stage of their development appears to have crafted an environment that encouraged them to focus more on the learning process and personal self-referenced improvement rather than the outcome (Duda et al., 1995; Roberts, Treasure, & Kavussanu, 1996). It was at this stage in the samples golfing careers that golf became a key source of

enjoyment within life and when they started to strategically plan their future pathway towards developing into elite senior level golfers.

Another important finding to emerge from study three was the ability of the sample to reflect self-sufficiently throughout their development which enabled them to take greater responsibility for, and make important decisions, within their on-going development as golfers. For example, they independently made the decision to start engaging with deliberate practice activities instead of relying solely on the guidance and advice of parents and EGU and county coaches. These findings align with the research undertaken by Jonker et al., (2011) which emphasized the valuable role that reflection may provide in the successful transition from elite youth to elite senior levels of performance.

The importance of guidance and social support from various contexts including parents, peers and coaches to sports performers has also been consistently identified in the literature as a crucial influence in the development of elite sports performance (Baxter-Jones & Maffulli, 2003; Côté, 1999; Durand-Bush & Salmela, 2002; Lauer et al., 2010a; Wuerth, Lee, & Alferman, 2004). These findings do not fully resonate with the participants experiences in study three as the levels of social support they received whilst they travelled the path from elite adolescent towards elite senior golfer reduced somewhat compared to earlier years. Importantly, the study also revealed how the participants had decided to take a self-directed, active role within their on-going development (e.g., when and what aspect of their game they would work upon and when they would compete) from a young age which intensified post 16 once the decision to specialise in golf was made instead of relying on parents and peers.

The findings of studies two and three also provide some support to previous research which has revealed how elite level sports performers tend to originate from, lowly populated rural towns and villages (e.g., Côté, et al., 2006). Although the majority of the existing research into this theory has been undertaken in North America, this finding may be useful for golf developers in the United Kingdom to consider because the nature of the game requires large open spaces to play and in rural areas it is probably more likely that the resources are readily available to play on (e.g., not too busy), cheaper and accepting of junior members. Although these assumptions are unsupported by evidence, such a possibility cannot be excluded and this may be a useful direction for future golf development research to focus.

7.3 Development of Aspiring Elite Adolescent Golfers

7.3.1 Practice Activities of Aspiring Elite Adolescent Golfers

At the start of this programme of research, relatively little was known about the role that deliberate practice may have to play in developing adolescent golfing excellence. The majority of existing sport related studies had tended to rely heavily upon retrospective estimations to obtain insights into the participation and practice history profiles of current elite senior level sports performers from a range of team and individual disciplines over the duration of their careers (e.g., Ford et al., 2009; Law et al., 2007) and apart from the rare occasion (MacDonald et al., 2009), the accuracy of this method had been criticised by researchers within the field (Deakin et al., 2006; Lauer et al., 2010; Starkes, 2000; Weir & Young, 2003).

A weakness of this approach is how it may provide a somewhat inaccurate reflection of the developments that a sports performer has actually undertaken throughout their sports career to date. To illustrate this point, Deakin and Cobley (2003) found that what

athletes report having done in terms of duration and content of practice may not accurately mirror what they actually did and so when an athlete is requested to remember their participation and practice trends over numerous years, the guarantee of gaining precise data is weakened. To overcome this accuracy problem, the unique study reported in chapter three employed both self-report diary logs and retrospective interviews which enabled a truer reflection and more robust assessment of the daily golf activities undertaken by aspiring elite adolescent golfers to be determined. This approach also addressed an important gap in the literature as it longitudinally tracked the microstructure of day to day activities performed and enabled actual and recalled data over the period of nine months to be compared for accuracy (objective one).

A significant finding by Ericsson et al., (1993) was how the attainment of musical excellence was only achievable after the accomplishment of roughly 10,000 hours or ten years of domain specific deliberate practice. In answering the first objective of this thesis, relatively large improvements in golf performance considering the stage of learning the participants were at in terms of their continuing golf development (e.g., handicap range between three and six) were encountered over a nine month time period although participants did not spend large amounts of time undertaking golf specific deliberate practice per se. In fact, it was found that 62 percent of all golf activities undertaken throughout the study were categorised as either golf competitions or competitive nine and 18 hole practice rounds undertaken alone or with peers that were carried out with high amounts of physical and mental effort and fun in the presence of peers.

This is an interesting finding and at face value provides partial support for the assumption that practicing deliberately when playing shots on the golf course (e.g., high

levels of mental and physical effort with a sole focus on performance enhancement) within competitions and competitive practice rounds, as opposed to a reliance on purely structured deliberate practice drills within a training environment may be beneficial for the on-going improvements in golf performance of high performing adolescent golfers who are approaching scratch handicap. This finding also lends support to Singer and Janelle (1999) who recognised the benefits that practicing deliberately within a competition environment may inflict upon the performance of aspiring elite sports performers who may have greater scope for improvement in their technical and tactical abilities than their elite counterparts. It also suggests how golf may have characteristics that are not yet incorporated into the modified sports specific deliberate practice framework prescribed by Helsen and colleagues such as how a self-paced, target sport may afford participants the opportunity to practice deliberately within competitive situations or whilst competing with peers on the course. The merits of practicing deliberately with others (e.g., peers and parents) also mirror the findings of Helsen et al., (1998) who found elite soccer and field hockey players had also undertaken large amounts of team based deliberate practice activities throughout their development to expert senior level status.

The unique methodological approach employed in study one also allowed for the comparison of actual and recalled data over the duration of the study to be statistically compared. This procedure revealed how self-report diary log and retrospective interview data were very similar as non-significant differences were revealed between the two data sets and effect sizes were small ranging ($d = 0.03$ to 0.31). Whilst it must be acknowledged how the time period of the study was relatively small in terms of the participants overall career development, these findings extend the current literature by providing evidence to suggest how retrospective recall is an accurate method to

determine volumes and intensities of golf activities experienced over the course of a nine month period. This finding also has important practical implications for future research which will be discussed later within this chapter.

7.3.2 Influence of Deliberate Practice on the Development of Aspiring Elite Adolescent Golfers (Performance and Psychological)

The combined findings of the first three studies in this thesis revealed how engaging with golf specific deliberate practice post 16 years of age aided the on-going improvements in golf performance of both aspiring and elite level adolescent golfers. These outcomes informed the unique nature of study four which represented the first attempt at determining if a golf specific deliberate practice intervention had any positive influence upon the putting performance (objective three) and future practice behaviours (objective four) of aspiring elite adolescent golfers through use of a SSD methodology and social validation and five month follow up interviews. Key to this study was the fact that participants were competent, high performing county standard adolescent golfers but had no previous experience with the task they performed throughout the intervention stages of the experiment (e.g., undertaking putting specific deliberate practice). Importantly and somewhat surprisingly given the emergence of sports expertise research in recent years, the findings of this study also made an original contribution to the deliberate practice literature as no existing studies had previously investigated the effects of deliberate practice regimes upon performance with adolescent golfers.

The findings of study four provide support for deliberate practice as an effective strategy for improving the golf putting performance of high performing adolescent golfers. Significant improvements in putting performance were achieved by three of the

sample after they were exposed with relatively limited amounts of deliberate practice over a short time period. Mean weekly performance measures were found to be significantly higher in the intervention phase than the baseline phase and the effect size was large (d = 3.12). Furthermore, participant one who undertook the greatest amount of deliberate practice throughout the study achieved the largest percentage improvements in performance within the sample which has important applied implications for future golf development systems.

Sustained participation and commitment to deliberate practice post intervention appeared to be closely matched with intrinsic motivation and perceived competency levels. For example, participants started to invest more time and greater levels of physical and mental effort than ever before into their golf development when they realised how they were making improvements in golf performance through a more formal approach to golf development This trend also relates to Lens and Rand (2000, p.199) who suggested "individuals like to do things they are good at and they also become good at things they like to do". The findings of study four also resonate with achievement goal theory (Nicholls 1984, 1989) as follow up interview data revealed how the participants started to evaluate their golf performance from a task orientated perspective for the first time after committing to long term deliberate practice. Specifically, the focus was now placed on self-referenced rather than normative judgements of competence and mastery.

The qualitative data obtained in study four further implies how undertaking the deliberate practice regimes may have enhanced the self-efficacy levels of aspiring elite adolescent golfers. For example, participants appeared to place greater levels of physical and mental effort, persistence and commitment into their training than ever

before and discussed how they could see the relevance in undertaking deliberate practice activities once they had been exposed with this form of training strategy for the first time. These findings are consistent with the research undertaken by Bandura and colleagues which implied that high levels of self-efficacy positively influence the amounts of effort, commitment and persistence that an individual places into a specified task (Bandura, 1986, 1997; Bandura & Wood, 1989). Study four also revealed how participants tailored their long term practice strategy to mirror the requirements of deliberate practice theory after experiencing this form of practice for the first time. In other words, exposure with a highly structured short game training protocol acted as a catalyst for change in their approach to practicing both their short game but also other elements of their game in the future. This observation, which was also evident in study three, suggests how the participants may have realised the influential role it may play in assisting them to perform on the national and international stage in the future. A further key finding from all four studies within the thesis was how participants found deliberate practice activities enjoyable to undertake which contradicts the findings of Ericsson et al., (1993) which revealed how world class musicians did not find deliberate practice enjoyable to undertake.

The role that psychology may play in the talent development process has received considerable research attention in recent years. The findings of this study illustrate how a range of psychological factors such as discipline that allow individuals to connect effectively with the developmental opportunities they are afforded (e.g., deliberate practice) must be developed if potential is to be fully accomplished (see MacNamara et al., 2010 for an overview). For example, the research undertaken by Holt and Dunn (2004) increased our understanding of how psychological characteristics have an important role to play in talent development by revealing how youth soccer players who

displayed discipline, commitment and resilience throughout their adolescence were more likely to successfully transit into professional levels of adult soccer. Similarly, Holt and Mitchell (2006) revealed how youth soccer players who failed to achieve professional status as adults lacked volitional behaviour and the self-determination to succeed. An important observation to emerge from studies three and four is the suggestion how psychological factors (e.g., commitment) appeared to play an important role in aiding the continued performance improvements of aspiring and elite adolescent golf performers once they started to engage with deliberate practice. These findings correspond with existing research which has highlighted determination and persistence (Bloom, 1985; Côté, 1999), long-term intrinsic motivation (Ward et al., 2004) and autonomy (Schoon, 2000) as critical ingredients required for the attainment of excellence. The findings also align with the review of primary and secondary influences on sport expertise undertaken by Baker and Horton (2004) which made the argument how psychological factors are necessary for both the acquisition and subsequent execution of expert sports performances.

It was also found how undertaking deliberate practice encouraged participants in studies three and four to increase their usage of golf specific mental skills such as goal setting and imagery in all practice and performance environments. This finding is consistent with research by Connaughton, Wadey, Hanton, and Jones (2008) who revealed how elite athletes perceived goal setting and imagery to be important strategies in aiding their preparation for all scheduled practices and competitions. The qualitative data from study four also underscores how the participants started to make greater use of psychological skills as they became increasingly self-regulated learners. This was demonstrated through the growing responsibility they started to take for the planning, self-evaluation and self-monitoring of their daily golf activities instead of relying on

guidance provided from either coaches or parents. The follow up interview data also revealed how the majority of the sample had developed an eagerness to sustain their new practice behaviours and had adopted an increasingly self-determined approach to developing golfing excellence.

The findings of studies three and four further indicate how it may be possible to enhance aspects of mental toughness through undertaking deliberate practice as a range of behaviours and attitudes displayed by the participants in the months following the introduction of specialised training protocols relate to descriptors of mental toughness provided by Crust, (2007), Jones, Hanton, and Connaughton (2007), Gucciardi, Gordon, and Dimmock (2008) and Sheard (2010). For example, these mental toughness theorists suggest mentally tough sports performers display high levels of commitment, discipline, self-motivation, independence and self-direction, self-appraisal and monitoring, resilience, perseverance and focus towards their long term development and achieving the career goals they set for themselves.

A consistent finding across all four studies was how no golf activities achieved high physical and mental effort ratings whilst at the same time receiving low ratings for fun. This opposes a key principle of the original deliberate practice framework prescribed by Ericsson et al., (1993) but lends further support to previous research in the sport domain (e.g., Helsen et al., 1998; Hodges and Starkes, 1996). This finding also conforms to the theoretical underpinnings of the sport commitment model (Scanlan et al., 1993) which specifies how levels of enjoyment and commitment towards an activity, which in this case was golf specific deliberate practice, are likely to be related in a positive manner. In response to the studies by Hodges and Starkes (1996) and Starkes et al., (1996), Ericsson (1996) did suggest that high enjoyment ratings for sport specific deliberate

practice schedules were a reflection of a participants level of enjoyment towards the sports they engaged within and not the nature or elements of practice undertaken. He also maintained how performers achieve heightened levels of satisfaction and fulfilment when they perform skills in which they are relatively competent and attribute high levels of enjoyment to the positive reinforcement and confidence this provides and not the conditions of deliberate practice. However, the qualitative measures undertaken in studies one, three and four of this thesis oppose the views of Ericsson et al., (1993) and lend support to the belief that participants ratings did accurately reflect their levels of enjoyment towards the experience of undertaking golf specific deliberate practice activities and not their love for the game.

The findings of all four studies also lend clear support to the deliberate play framework (Côté, 1999) as an appropriate model to follow for acquiring both highly skilled sub-elite (e.g., handicap between six and zero) and elite (e.g., initial selection for EGU representative squads) levels of adolescent golf performance. No evidence was found in any of the four studies for elite levels of adolescent performance ensuing from specialising early and undertaking only golf specific deliberate practice during childhood and early adolescence. In other words, all participants within the four studies avoided any forms of specialised training within golf and all other sports they were active within up to the mid-teenage years. Furthermore, no participant from any of the four studies demonstrated any clear indications of golfing excellence throughout their childhood and early teenage years which suggests that high standards of golf performance as a youngster may not be an important requirement for success in later life.

This finding links well with a comprehensive literature which suggests how superimposing specialised training regimes onto aspiring elite sports performers from an early age is not a pre-requisite for later success as a senior level performer (Vaeyens et al., 2009) and how possessing "talent" as a youngster does not guarantee a successful sporting career as a senior level performer. This research which has concentrated on studying elite level junior to senior transitions has consistently revealed how world class youth level sports performers have often failed to progress into the elite world class senior ranks whilst several sub-elite child performers have successfully bridged the transition onto the elite senior level platform (see Stambulova, 2009 for an overview). The majority of participants in the four studies were also classified as middle to upper class based on parental professions which conform to a number of studies which have revealed how middle class children receive greater amounts of financial and pastoral support throughout their sports careers than those from lower-income families.

7.4 Limitations

The limitations of the thesis must be acknowledged to aid the next stage of talent development in golf research. Firstly, diary logs in study one were self-report in nature which may be open to misinterpretation and only the golf activities undertaken over a period of nine months were tracked. Secondly, the study failed to determine the micro-structure of each participants participation and competition histories such as the number of drives, putts or iron shots played. A time delay was also evident in the recording of data as participants were instructed to complete their diaries between 20.00 and 22.00 hours instead of immediately after each event which may have influenced the accuracy of data provided. It could also be argued how the accuracy of diary data may have been supported by the recollections of coaches. However, the decision not to do so was fully

justified as the findings of study one revealed how they did not operate sufficiently close enough with the participants on a daily basis to gage precisely the volumes and intensities of all golf activities undertaken as large volumes of golf activities were undertaken outside of prescribed academic hours without the presence of a coach (e.g., during weekends and evenings). This finding also raises questions over the accuracy of previous research which has relied solely on the recollections of coaches and parents to obtain information upon the practice histories of elite level athletes (e.g., Johnson et al., 2008). Finally, the participants were instructed to recall activities in the retrospective interviews that they had already reflected upon whilst completing the self-report diary log which means they already focused their attention on these activities previously which might have enhanced recall.

As a means to improving the accuracy of career developments undertaken by participants as they unfold over periods of months and years, future longitudinal research is encouraged to make use of available technologies such as global positioning system tracking devices. This approach would allow researchers to assess the specific content and duration of practice activities such as amounts of deliberate practice undertaken, length of any rest periods and time spent receiving feedback from a coach during any training session or event. Although longitudinal studies of this nature may prove costly and time consuming, they would allow for the accuracy of actual and recalled data collected over a longer period than the nine month timeframe used in study one to be compared. Another shortcoming of the existing sports expertise literature has been the failure by researchers to determine the microstructure of practice trends and whilst not discounting the value of the data that emerged, studies one and two aren't exempt from this criticism. For example, it would have been useful to have determined the ratios of time spent undertaking long and short game activities and what the content

of these sessions comprised. This level of scrutiny may also enable researchers to take the next steps in deliberate practice research by determining the nature of what participants actually do both mentally and physically in-between shots when practicing deliberately on both the course and practice grounds. Also, in light of the retrospective nature of the data collection process, the findings of study two must be treated with some caution as participants were recalling experiences that occurred in some cases up to ten years previously.

A weakness of the final study was how the effects of a systematic training protocol upon only one motor task were examined. Furthermore, tracking the number of putts taken and successfully holed from the distances tested in the intervention within both competition and practice activities both during and immediately after the intervention for a period of weeks and months is an approach future researchers may wish to adopt. Another criticism of study four was the failure to use self-report diary logs to longitudinally determine the micro-structure of the day to day golf activities undertaken in the five months after the completion of the intervention and to collect social validation data before and during the study (Page & Thelwell, in press). Ratings of perceived competence, self-efficacy, mental toughness characteristics and levels of enjoyment at different stages throughout the deliberate practice intervention may also have been obtained for each participant using suitable psychometrics that have been deployed within related research in the past. It must also be stressed how the thesis focussed upon the developments of elite and aspiring elite adolescents and not senior level professionals, and as such the participants are therefore not yet classified as “elite” per se. However, three of the sample from studies two and three have now turned professional and since the data collection period have competed frequently upon the European and Challenge golf tours during the 2010-2011 and 2011-2012 seasons.

Furthermore, one participant from the forth study secured selection for the 2011-2012 EGU under 18`s development squad in December 2011.

7.5 Recommendations for Future Research

Whilst the four studies within this thesis extend what is known about the role that deliberate practice may play in developing adolescent golfing excellence, they inevitably identify where future studies need to be focussed. Primarily, further research is recommended to utilise both qualitative and quantitative approaches to extend and answer the elusive questions we still face. Within this mixed method paradigm, researchers are encouraged to make greater use of longitudinal designs to examine the micro-structure of practice undertaken as this approach would appear to be a more commendable avenue to follow than relying solely on traditional retrospective approaches. Such investigations may also consider examining the practice regimes of current elite senior level golfers over time (e.g., established European Tour players) and determining if elite adolescent male and female golfers encounter similar developmental pathways and practice histories.

On the grounds that it is possible to accurately determine the nature and intensities of golf activities undertaken over a period of nine months, future investigations which concentrate on using self-report diary logs and/or retrospective interviews on an annual basis to longitudinally track a sample of participants from the four studies over the next five to ten years may address a key gap in the extant literature by revealing if any actually do complete 10,000 hours of deliberate practice and go on to achieve the grade as senior elite level golfers. If this does occur, it may also shed light upon any additional moderators of performance, other than deliberate practice, that may play a role in the acquisition of senior level golfing excellence. This approach would also

enable the researcher to take the next step in golf specific deliberate practice research by identifying the microstructure of developments that differentiate elite adolescent golfers who successfully transit into the elite senior level ranks of performance with those that that do not. Another step forward in golf development research would be to conduct a longitudinal deliberate practice study that focusses on more elements of a golfer's game than just putting.

7.6 Implications

Based on the collective findings of all four studies, this thesis offers several theoretical and practical implications for educating aspiring elite golfers, practitioners, applied sport psychologists, parents and policy makers about the role and significance of both deliberate practice and deliberate play theory in developing adolescent golfing excellence and when the most appropriate time for introducing such development interventions should occur. The main theoretical implication to emerge from this thesis is the suggestion how adolescent golfing excellence seems to be achievable through a pathway that closely resembles deliberate play (Côté & Fraser-Thomas, 2007; 2008) without the need for exposing young golfers with long term physically and mentally demanding deliberate practice protocols during the childhood and early teenage years. As a substitute, the findings encourage youngsters who harbour aspirations of becoming elite level adolescent golfers in later life to engage regularly with playful activities from across a range of sports, including golf, until the mid-adolescent years as diversified developments of this nature appear sufficient for the continued reduction in annual golf handicap scores. This path also seems appropriate in securing selection for adolescent County and EGU international squads and has been shown to maintain long term intrinsic motivation and adherence to their primary sport of golf. Importantly however, a long term investment from a deliberate play trajectory towards golf specific deliberate

practice regimes from the age of approximately 16 years of age and beyond appears to play a decisive role in not only ensuring continued performance improvements and the successful transition from aspiring elite to elite adolescent golfer status, but also the positive manner in which levels of intrinsic motivation, perceived competence and wide ranging self-regulatory and psychological skills are developed and maintained.

Specifically, the results of the four studies in this thesis illustrate the beneficial effects of deliberate practice in securing continued improvements in performance outcomes and positive psychological responses once adolescent golfing excellence has been achieved. Evidence collated also encourages golf development policy makers and coaches to restrict the amounts of such training strategies their protégés undertake until the mid-teenage years. This approach which refrains from superimposing highly specialised training programmes upon developmental junior golfers may be perceived by many who work within existing golf development systems as being overly cautious and protective of "talented" young golfers. However, golf appears to be one of very few sports where world class levels of performance have been shown to occur relatively late in a sports performers career. For example, based on the fact how Darren Clarke won the British Open for the first time in July 2011 aged 42, the need to fulfil the well accepted 10,000 hour rule as soon as possible to provide oneself with the possibility of achieving senior level excellence has to be carefully considered. Indeed, undertaking specialised golf training from an early age and running the risk of possibly becoming injured or losing the motivation to remain engaged within golf may not be as important when contrasted with developmental requirements faced by aspiring elite gymnasts or swimmers who are required to perform on the world class stage at a much earlier age.

In addition to deliberate practice activities, an important lesson learned from studies three and four was how self-regulatory skills seemed to play a key role in the continuing development of elite and aspiring elite adolescent golfers. In this regard, those involved in golf development systems and high performance coaching may wish to create increasingly autonomy supportive learning environments that encourage aspiring elites to take greater control over their thoughts, feelings and actions from increasingly young ages (Baumeister & Vohs, 2007; Jonker et al., 2010). This approach may equip participants from a young age with a range of self-determined psychological characteristics including resilience and dedication that appear important in aiding the completion of high volumes of deliberate practice required to achieve senior levels of excellence in later life. However, the integration of these findings into future golf development systems may require coaches to reconsider how they view the talent development process and start to move away from pathways that may be based primarily on tradition and emulation and towards scientifically rigorous informed practices (Abbott et al., 2005; Williams & Hodges, 2005). For example, chapter two revealed how national governing bodies in a range of sports have persisted in recent years to identify future talent on the outcomes of physiological, anthropometric and performance procedures. In agreement with mounting evidence which demonstrates the importance of psychological skills and behaviours in both identifying and developing sporting excellence, (see Macnamara & Collins, 2011, 2012, for an overview), the findings of this thesis suggest those involved in golf development should also start to identify talented young golfers who display the types of psychological qualities which are likely to assist and withstand the necessary volumes of deliberate practice required in later life to achieve expert status (e.g., the persistence and dedication to practice and willpower to progress).

Based on the findings of all four studies, talent development policy makers and practitioners in golf are further encouraged to consider how deliberate practice may be physically and mentally demanding yet enjoyable and fun to undertake. In agreement with Jonker et al., (2011), the findings from studies three and four further advocate how practitioners and policy makers involved in elite golf development programmes should create learning environments which enable greater opportunities for aspiring and elite adolescent golfers to reflect critically upon all golf activities performed with a view to improving the self-regulatory skills and self-determined levels of motivation that the existing research has identified as key for fulfilling an individual's full sporting potential (Jonker et al., 2010). It is also important that those involved in golf development systems who may wish to start educating adolescent golfers about the merits of deliberate practice long term and how to apply its theoretical tenets throughout their development are also aware of how an overemphasis on this form of training without appropriate rest and recovery periods at both the junior and senior ranks of elite level golf, may lead to reductions in performance, intrinsic motivation and enjoyment (Côté & Fraser-Thomas, 2008).

7.7 Conclusions

Based on the combined findings of the thesis, the development of expert male adolescent golf performance appears to be a multifaceted process determined by a range of environmental, physical, social and psychological influences which reflects the findings of existing sports related research (e.g., Bloom, 1985; Côté, 1999). What is known about the role that deliberate practice may play in developing expert level adolescent golfers has also been advanced by the findings reported in the four studies of this thesis. This early specialisation approach towards developing expert status claims the attainment of excellence within any given field is not possible without a minimum

of 10,000 hours or ten years exposure with highly effortful, performance focussed training regimes.

Collectively, the findings from the four studies in this thesis support a growing body of literature which opposes the value of superimposing programmes of deliberate practice within the day to day developments of young individuals who harbour ambitions of becoming elite level senior sports performers (e.g., Baker et al., 2003; Bullock et al., 2009; Côté , 1999; Johnson et al., 2008). The developments encountered by participants across all four studies may also benefit their long term physical, psychological and social development as considerable research suggests how exposing aspiring elite sports performers with deliberate practice regimes from a young age significantly increases the likelihood of encountering dropout and burnout (Carlson, 1988; Wall & Côté, 2007) and injury (Baxter-Jones & Helms, 1996; Law et al., 2007) in later life.

In more concrete terms, the evidence presented in this thesis suggests golf related activities undertaken during childhood and early adolescence do not need to be of a deliberate nature to achieve selection for international adolescent golf squads. This finding is supported by the fact that participants in all four studies participated long term in several sports within an enjoyable, non-competitive environment from their childhoods to the mid-teenage years which provides supportive evidence for the deliberate play framework as an appropriate path to travel. In further support for the notion of early diversified paths of talent development (Côté, 1999, Côté & Fraser-Thomas, 2007), the findings of the four studies suggest how aspiring elite adolescent golfers may benefit from experiencing a diversity of sports activities (including golf) within non-competitive learning environments throughout childhood and the early teenage years. This approach to development which closely resembles the theoretical

underpinnings of deliberate play theory (Côté & Fraser-Thomas, 2007) encourages fun and enjoyment for sport as a whole and aims to foster the on-going improvements of generic motor skills and a variety of physical, psychological and social characteristics that the existing literature suggests is required to successfully undertake highly specialised golf specific protocols when they are introduced during late adolescence and beyond.

Importantly, there is evidence within all four studies to support some of the theoretical explanations of expertise proposed by Ericsson and colleagues (2003, 2007a) as golf specific deliberate practice does appear to have a key role to play in facilitating improvements in golf performance and the development of wide ranging psychological skills from the age of approximately 16 years onwards when greater volumes of specialised practice are required to achieve smaller gains in performance. Also, the deliberate practice framework was exposed as an effective strategy for highly skilled (studies one and four participants) and elite (studies two and three participants) adolescent golfers to undertake as a mechanism for reducing golf handicap from the mid-teenage years onwards as they aim to successfully bridge the gap between elite adolescent and elite senior golfing status. However, early specialisation and investment in a sport as advocated by Ericsson (2003) was not obvious for any of the elite adolescent golfers in the study.

The take home message from the four studies within this thesis is the suggestion that abstaining from deliberate practice until the late teenage years and focussing instead on participating within a variety of sports is an appropriate path to travel for acquiring adolescent golfing excellence. Importantly though, golf specific practice post 16 needs to be of a increasingly deliberate nature if continued improvements in performance are

to be maintained as participants pass through the later stages of their adolescence and room for improvement in skill level reduces. Talent development in golf research is still in its relative infancy and few studies have examined the role that deliberate practice may play in developing golfing excellence. However, the findings of the four empirical studies within this thesis have contributed to the existing knowledge base and have created a firm foundation on which future research, policy and practice may build.

The Role of Deliberate Practice in Developing Adolescent Golfing Excellence

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Volume 2: Appendix

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APPENDIX A

A1: Participant Information Pack

A2: Informed Consent Form

A3: Self-Report Diary Log and Retrospective Interview Schedule

PARTICPANT CONSENT FORM

You are being invited to take part in a research study. Before you decide to take part or not, it is important for you to understand why the research is being undertaken and what commitments it will involve on your behalf. Please take time to read the following information carefully. You are encouraged to ask the researcher any questions or queries that you may have regarding the research.

Purpose of the study
To undertake a longitudinal study investigating the nature of the training practices, activities and competitions that sub elite adolescent golfers undertake throughout the duration of a nine month period.

Why have I been chosen?
You are classified as a sub elite adolescent golfer. Specifically, your current handicap score is four or less, you are a member of the Uclan Golf Development Squad and you have represented your county at amateur status within the past year.

Do I have to take part?
No, it is entirely up to you to decide whether or not to take part within the study. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You will be free to withdraw your consent during the **first data collection period only** without providing a reason and with no disadvantage to yourself.

What will happen to me if I take part?
You will maintain a diary by completing a daily subjective analysis and written explanation of all concurrent practices, instruction, competition and training that you undertake throughout a specified time frame within the year (four seven day periods during **October 2009, January 2010, April 2010 & June 2010**).

What do I have to do?
You will be provided with a diary that is designed to elicit information relating to all the golf training practice and competition related activities that you undertake during periods of a golf season. You will be required to answer a series of self-reflective questions relating to the amount of golf related practice, competition and instruction activities that you undertake throughout a typical day. Additionally, you will complete subjective ratings that relating to the amount of physical and mental effort undertaken and fun that you experience whilst undertaking such activities. You will receive instructions from the lead researcher upon how to complete the specific sections of the diary. This will serve to both inform and reinforce the roles, responsibilities and requirements expected of you throughout the study. As the data collection process embraces a longitudinal design (nine months in duration) a large commitment in terms of continual reflection and analysis of all training and competition related activities undertaken from all participants.

What if there is a problem?
Any complaint relating to the way you have been dealt with or treated during the study or any possible harm you might suffer will be addressed accordingly. If you have any concerns about any aspect of this study, you should ask to speak with the researcher who will do his best to answer your questions.

Will my taking part in the study be kept confidential?
Yes. Inclusion within this study is voluntary and all collected data will remain strictly confidential. The lead researcher and supervisory team members are the only individuals who will have access to your data. During periods when data collection is not required, the diaries will be stored in a private filing cabinet that only the lead researcher has access to. Once the data collection period is completed, all diaries will be kept confidential and secure under an anonymous participant number prior to being analysed. The findings extracted from the diaries will be stored upon a private computer that only the investigator and supervisory team have access to.

What will happen to the results of the research study?
All collected data will be kept in anonymous format to allow any further investigation or critique of the research to take place. It is intended that the results of this study will be published in scientific journals. You will be guaranteed a copy of the findings of the study upon completion at your request.

Who has reviewed the study?
The study has been reviewed by the School of Psychology, University of Central Lancashire, Research Ethics Committee.

Contact details
If you require any further information regarding this research project or any of the questionnaires please call Richard Hayman on 07813 029666 or write to:

Mr R. Hayman
Centre for Applied Sport and Exercise Science
The University of Central Lancashire
Preston
PR1 2HE
Email: RHayman@uclan.ac.uk

Or alternatively contact Richard Hayman`s PhD supervisor: **Professor Remco Polman (CPsychol)** Director of Centre for Applied Sport and Exercise Science, The University of Central Lancashire, Preston, PR1 2HE.
Tel: 01772 894467.
Email: RCJPolman@uclan.ac.uk

Researcher: Richard Hayman MSc (PhD Student within the Centre for Applied Sport and Exercise Sciences, School of Psychology, The University of Central Lancashire).

Research supervisor: **Professor Remco Polman C.Psychol** (Director of the Centre of Applied Sport and Exercise Sciences, School of Psychology, The University of Central Lancashire).

Participants Name:_____

Golf handicap: _____

Gender: Male/Female

Age:_____

Please circle YES or No to questions below:

I fully understand what is involved in taking part in this study?
YES/NO

Have all your questions regarding the research process been clarified?
YES/NO

Is there any part of the research process you feel unhappy about?
YES/NO

I agree to take part in the above study?
YES/NO

Do you understand your rights of withdrawal during any part of the research process?
YES/NO

Any questions I have about the study, or my participation in it, have been answered to my satisfaction?
YES/NO

Signed Participant:_____Date:_____
Signed Researcher:_____Date:_____

The Practice Histories of Amateur Adolescent Golfers

NAME:

DATA COLLECTION PERIOD:

Richard Hayman
University of Central Lancashire
Centre for Applied Sport and Exercise Sciences
E-mail: rhayman@myerscough.ac.uk
Tel: 01995 642282

Consent Form

Principle Investigator: Richard Hayman (PhD Student within the Centre for Applied Sport and Exercise Sciences, School of Psychology, University of Central Lancashire).

Director of Studies: Professor Remco Polman **C.Psychol** (Director Centre for Applied Sport and Exercise Sciences, School of Psychology, University of Central Lancashire).

Participants Name:

Golf handicap:

Gender: Male/Female

Number of years playing Golf:

Age:

Please circle YES or No to questions below:

I fully understand what is involved in taking part in this study?
YES/NO

Have all your questions regarding the research process been clarified?
YES/NO

Is there any part of the research process you feel unhappy about?
YES/NO

Do you understand your rights of withdrawal during any part of the research process?
YES/NO

Any questions I have about the study, or my participation in it, have been answered to my satisfaction?
YES/NO

_____ _____
Signature of Research Participant Date

_____
Printed name

Instructions

This instructional guide has been designed to inform and reinforce the roles, responsibilities and requirements that are expected of you throughout the study.

- Multiple diary logs designed to obtain information relating to all the golf related activities that you have undertaken each day for a period of one week are contained in this booklet.

- Please complete one diary log **every day** (at the **SAME** time each day). You will be asked to repeat this process every day for the next seven days.

- Part one requires you to rate on a likert scale of **0-10** (see laminated ratings scale), the amount of physical and mental effort and fun of each separate golf related activity that you experienced that day.

- Part two requires you to provide written explanations for the subjective ratings provided in section one.

- The diaries should not be completed on days if no golf related activities are undertaken (i.e. if you are injured, travelling, rest day etc).

- In an effort to improve completion rates of diaries, you will receive a telephone call by the principle investigator during both the morning and evening on the first day of the study, and the evening of every third day hence of the study.

- For further clarification, an example completed diary sheets are located on pages 21 and 22.

- You will be contacted once the study is complete to assess the accuracy and interpretations of the collated data. This will allow you the opportunity to correct any errors or wrong interpretations that the principle investigator may have made during the analysis of data.

Part 1
Day 1

Date:_____ Time of completion:_____

Instructions: Please take time to consider all the golf related activities that you have undertaken today. Complete the tables provided. Check to make sure you have answered all items appropriately.

Activities Undertaken Today	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)

Part 2

Value	Explanation
Physical	
Mental	
Fun	

The adjectives below may help you to describe your justification for the scores that you provided:

Energetic	Intense	Calm	Tired	Vigorous
Lively	Enjoyable	Boring	Tedious	Fun
Playful	Focused	Distracted	Social	Rewarding

Part 1
Day 2

Date:_____ Time of completion:_____

Instructions: Please take time to consider all the golf related activities that you have undertaken today. Complete the tables provided. Check to make sure you have answered all items appropriately.

Activities Undertaken Today	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)

Part 2

Value	Explanation
Physical	
Mental	
Fun	

The adjectives below may help you to describe your justification for the scores that you provided:

Energetic	Intense	Calm	Tired	Vigorous
Lively	Enjoyable	Boring	Tedious	Fun
Playful	Focused	Distracted	Social	Rewarding

Part 1
Day 3

Date:_____ Time of completion:_____

Instructions: Please take time to consider all the golf related activities that you have undertaken today. Complete the tables provided. Check to make sure you have answered all items appropriately.

Activities Undertaken Today	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)

Part 2

Value	Explanation
Physical	
Mental	
Fun	

The adjectives below may help you to describe your justification for the scores that you provided:

Energetic	Intense	Calm	Tired	Vigorous
Lively	Enjoyable	Boring	Tedious	Fun
Playful	Focused	Distracted	Social	Rewarding

Part 1
Day 4

Date:_____ Time of completion:_____

Instructions: Please take time to consider all the golf related activities that you have undertaken today. Complete the tables provided. Check to make sure you have answered all items appropriately.

Activities Undertaken Today	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)

Part 2

Value	Explanation
Physical	
Mental	
Fun	

The adjectives below may help you to describe your justification for the scores that you provided.

Energetic	Intense	Calm	Tired	Vigorous
Lively	Enjoyable	Boring	Tedious	Fun
Playful	Focused	Distracted	Social	Rewarding

Part 1
Day 5

Date:_____ Time of completion:_____

Instructions: Please take time to consider all the golf related activities that you have undertaken today. Complete the tables provided. Check to make sure you have answered all items appropriately.

Activities Undertaken Today	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)

Part 2

Value	Explanation
Physical	
Mental	
Fun	

The adjectives below may help you to describe your justification for the scores that you provided.

Energetic	Intense	Calm	Tired	Vigorous
Lively	Enjoyable	Boring	Tedious	Fun
Playful	Focused	Distracted	Social	Rewarding

Part 1
Day 6

Date:_____ Time of completion:_____

Instructions: Please take time to consider all the golf related activities that you have undertaken today. Complete the tables provided. Check to make sure you have answered all items appropriately.

Activities Undertaken Today	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)

Part 2

Value	Explanation
Physical	
Mental	
Fun	

The adjectives below may help you to describe your justification for the scores that you provided.

Energetic	Intense	Calm	Tired	Vigorous
Lively	Enjoyable	Boring	Tedious	Fun
Playful	Focused	Distracted	Social	Rewarding

Part 1
Day 7

Date:_____ Time of completion:_____

Instructions: Please take time to consider all the golf related activities that you have undertaken today. Complete the tables provided. Check to make sure you have answered all items appropriately.

Activities Undertaken Today	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)

Part 2

Value	Explanation
Physical	
Mental	
Fun	

The adjectives below may help you to describe your justification for the scores that you provided:

Energetic	Intense	Calm	Tired	Vigorous
Lively	Enjoyable	Boring	Tedious	Fun
Playful	Focused	Distracted	Social	Rewarding

Subjective Ratings Scale

Using the scale below, rate the amount of mental effort, physical effort and fun experienced during each activity undertaken.

0 – Very, very low

1 –

2 – Fairly low

3 –

4 – Moderate

5 –

6 – High

7 –

8 – Very High

9 –

10 – Very, very high

Day 1

Date:_____ Time of completion:_____

Instructions: Please take time to consider all the golf related activities that you have undertaken today. Complete the tables provided. Check to make sure you have answered all items appropriately.

Activities Undertaken Today	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)
Long game practice (100 yards in)	9.00 am	10.15 am	10	6	6
Chipping	10.30 am	11.00 am	8	8	6
Putting (15 yards and less)	1.00 pm	1.20 pm	8	8	8
18 hole golf play with friend	2.00 pm	5.30 pm	4	10	10

Example of completed diary sheets – Part 2

Value	Explanation
Physical	I undertook plenty of hard repetitive physical practice (ensuring correct technique, quality of shot posture and grip) in the long game, chipping and putting practice sessions and found the practices rewarding. Clear improvements in accuracy and distance covered were apparent at the end of each session. I worked especially hard during my long game practice as this is the weakest part of my game that requires improvement.
Mental	I focussed a large amount of mental effort (pre shot routines, imagery, concentration and focus) into all the activities. I do tend to lose mental focus easily when I play a collection of poor shots and this occurred again during the long game practice. I had very high mental effort on the course during the 18 hole golf play as more external variables had to be taken into account and I wanted to practice my pre shot routine before every shot.
Fun	I enjoyed the sessions today (except long game), especially the 18 hole game this afternoon. I played well and improved my score from last week by four shots. I enjoy playing with my friends as we are competitive with each other and always want to win. The long game practice was enjoyable at first but once I hit three poor shots in succession I became frustrated with myself and started to lose focus and question my ability.

The adjectives below may help you to describe your justification for the scores that you provided:

Energetic	Intense	Calm	Tired	Vigorous
Lively	Enjoyable	Boring	Tedious	Fun
Playful	Focused	Distracted	Social	Rewarding

Study One Retrospective Interview Schedule

Month	Nature of Golf Activity	Time per Week (mins)	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)
October 2009					
January 2010					

April 2010					
June 2010					

Study One Biographical Participant Information

Participant	Date of Birth	Fathers Profession	Siblings (age)	Education: GCSE Grades	Born	Raised	Primary Motive to Play Golf
1	11.8.1993	Own Painting Company	1 brother (20)	3B,6C	Catterick, Yorkshire	Catterick, Yorkshire	Watched Golf on Television
2	14.2.1992	Retired Policeman	1 brother (23)	3B,6C	Heswell, Cheshire	Heswell, Cheshire	Influence of Father
3	13.9.1991	Chef	1 brother (16)	3B,5C	York	York	Influence of Uncle
4	20.11.1992	Delivery Driver	1 brother (20)	8B,1C,1E	Bolton	Bolton	Influence of Cousin
5	31.12.1992	School Teacher	1 brother (11)	1A,2B,6C	Wigan	Wigan	Lived Next to Golf Course
6	14.1.1993	Manager at British Telecom	1 brother (26)	4C,5D	Preston	Preston	Influence of Brother

7	20.8.1993	Greengrocer	1 sister (13)	1A,6B,4C	Sheffield	Sheffield	Influence of Mother
8	3.3.1993	Ex Pro Sportsman	1 brother (9)	1A*,4A,2B,4C	Wigan	Wigan	Influence of Father
9	26.1.1992	Graphic Designer	1 sister (23)	12A,1B,1E	Poulton, Lancashire	Poulton, Lancashire	Influence of Father

Notes

APPENDIX B

B1: Participant Information Sheet

B2: Informed Consent Form

B3: Interview Protocol (adapted from Côté, Ericsson, & Law, 2005)

PARTICIPANT INFORMATION SHEET

You are being invited to take part in a research study. Before you decide to take part or not, it is important for you to understand why the research is being undertaken and what commitments it will involve on your behalf. Please take time to read the following information carefully. You are encouraged to ask the researcher any questions or queries that you may have regarding the research.

Purpose of the study
To explore factors influencing the development of expert performance in adolescent golfers.

Why have I been chosen?
You have been classified as an elite adolescent golfer as your current handicap score is one or less and you have represented your country at amateur status within the past year.

Do I have to take part?
No, it is entirely up to you to decide whether or not to take part within the study. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You will be free to withdraw your consent and participation from the study at any point before the end of the second interview without the need for giving a reason and with no disadvantage to yourself.

What will happen to me if I take part?
You will participate in **one** interview with the researcher. The interview will comprise a similar framework utilised by Côté, Ericsson and Wall (2005) and has been modified accordingly to ensure specificity to golf. The interview guide contains a predetermined schedule of both open ended and standardised questions. The interview procedure employed is designed specifically to obtain information relating to the development of your achievements in golf, in addition to factors that may have contributed towards your progression and development, including insight into career history, involvement in other sporting activities, social support systems, physical growth and maturation and quality of training resources experienced.

What do I have to do?
You will be required to think hard and answer all questions within both interview schedules in a detailed manner. The interview is expected to last for **approximately 90 minutes** in duration. Please be aware that although an estimated interview duration is provided, there is no guarantee that this time limit will be strictly adhered too and they may vary in duration between participants. Interviews will be terminated once the researcher is satisfied that that all questions posed have been answered in a detailed manner. You are free to refuse to answer any questions within the interview schedule.

What if there is a problem?
Any complaint relating to the way you have been dealt with or treated during the study or any possible harm you might suffer will be addressed accordingly by the researcher. If you have any concerns about any aspect of this study, you should ask to speak with the researcher who will do his best to answer your questions. If you remain unhappy and wish to complain formally, you can do this through the **University Director of Research**, University of Central Lancashire, Preston, Lancashire, PR1 2HE.

Will my taking part in the study be kept confidential?
Yes. All information which is collected about you during the course of the research will be kept strictly confidential. Only the investigator and supervisor will know which participant corresponds to which number.

What will happen to the results of the research study?
All collated data will be kept in anonymous format to allow any further investigation or critique of the research to take place. Also, any identifying detail from anything that you quote or state (e.g., extracts and quotations) will be removed to ensure anonymity as it's intended that the results of this study, will be published in scientific journals and presented at related conferences. You will be guaranteed a copy of the findings of the study upon completion at your request.

Who has reviewed the study?
The study has been reviewed by the School of Psychology, University of Central Lancashire, Research Ethics Committee.

Contact details
If you require any further information regarding this research project or any of the questionnaires please call Richard Hayman on 01995 642282 or write to:

Mr R. Hayman
Department of Golf, Sport and Leisure
Myerscough College
Bilsborrow
Preston
PR3 ORY
Email: rhayman@myerscough.ac.uk

Or alternatively contact Richard Hayman`s PhD supervisor: **Professor Remco Polman (CPsychol)** Director of Centre for Applied Sport and Exercise Science, The University of Central Lancashire, Preston, PR1 2HE.
Tel: 01772 894467
Email: RCJPolman@uclan.ac.uk

PARTICPANT CONSENT FORM

Researcher: Richard Hayman MSc (PhD Student within the Centre for Applied Sport and Exercise Sciences, School of Psychology, The University of Central Lancashire).

Research supervisor: **Professor Remco Polman C.Psychol** (Director of the Centre of Applied Sport and Exercise Sciences, School of Psychology, The University of Central Lancashire).

Participants Name:_____

Golf handicap: _____

Gender: Male/Female

Age:_____

Please circle YES or No to questions below:

I fully understand what is involved in taking part in this study?
YES/NO

Have all your questions regarding the research process been clarified?
YES/NO

Is there any part of the research process you feel unhappy about?
YES/NO

I agree to take part in the above study?
YES/NO

Do you understand your rights of withdrawal during any part of the research process?
YES/NO

Any questions I have about the study, or my participation in it, have been answered to my satisfaction?
YES/NO

Signed Participant:_____Date:_____

Signed Researcher:_____Date:_____

Interview One

The framework of this interview schedule is adopted from Côté et al. (2005) and modified specifically to golf**.**

Task One
I am interested in your early sport involvement. Firstly, I would like to focus on the activities that you were involved in when you **were young (infancy school age onwards: six years old +)**. I would like you to list your involvement outside of mandatory school activities e.g.

- Music
- Dance
- Play/Other domains of activity.

Looking back over your entire life please tell me of any type of activity that you engaged in on a regular basis before you decided to specialize in golf.

What musical, sport, play and artistic activities, if any, were you participating in before becoming seriously involved in golf? Please list all of these activities.

Any sport activity?
If YES:
How old were you when you first got started?
How long have you kept up the involvement?
Please tell me about any periods when your involvement was stopped.

Any musical activity?
If YES:
How old were you when you first got started?
How long have you kept up the involvement?
Please tell me about any periods when your involvement was stopped.

Any artistic activity such as dance or drawing?
If YES:
How old were you when you first got started?
How long have you kept up the involvement?
Please tell me about any periods when your involvement was stopped.

Organized games with rules supervised by self and peers (e.g. game of street football)
If YES:
How old were you when you first got started?
How long have you kept up the involvement?
Please tell me about any periods when your involvement was stopped.

Any other activity that consumed large amount of your time (e.g. watching sport on TV)
If YES:
How old were you when you first got started?
How long have you kept up the involvement?
Please tell me about any periods when your involvement was stopped.

Task Two: Fill in Chart One (Early Activities)

For each of the activities that you have provided, can you provide answers to the following headings in the table:

- Age Started.
- Age Stopped.
- Overall Ability When stopped (0 – 10).
- Training sessions per week engaged in.
- Number of Hours per session in activity.
- Age of peers you practiced played and competed with.
- Value of each activity in relation to enhancing your performance in golf (0 – 10).
- Reasons to values provided.

Additionally, please answer the following questions.

- Could you discuss how the activities outlined in chart one have influenced your involvement in golf?

- At what age did your primary sport involvement (golf) become a priority in your life?

- Can you recall any of the factors that led you to start regular involvement in this primary sport?

Task Three: Development as a golfer

I would now like to focus more specifically on your **development as a golfer**. I will try to get a sense of your development in golf by assessing different factors that may have contributed to your achievements and status.

In this section of the interview different aspects of your development within golf will be explored. However, firstly I would like you to answer a series of questions relating to your personal reference information.

What is your date of birth?

How old were you when you participated for the first time in the following activities on a **regular basis?**

____ years old - for first regular involvement in golf as a child or adolescent.

____ years old - for first involvement in supervised training by an adult in golf.

____ years old - for first involvement in training not supervised by an adult in golf.

Performance career

Competition at the club or school level

___ years old for first participation in golf.

___ years old when recognized among top five players at your golf club.

___ years old when recognized as the best player at your golf club.

Competition at the county level

___ years old for first participation on a county golf team.

___ years old when recognized among top five players at county level in golf.

___ years old when recognized as the best player at the county at golf.

Competition at the region level

___ years old for first participation on a regional golf team .

___ years old when recognized among top five golfers at the regional level.

___ years old when recognized as the best golfer at the regional level.

Competition at the national level

___ years old for first participation on a national team.

___ years old when recognized among top five players at the national level.

___ years old when recognized as the best golfer at the national level.

Competition at the international level (e.g. Walker Cup)

___ years old for first participation in a major international event.

___ years old when recognized among top five players in the world in your position.

___ years old when recognized as the best player in the world in your position.

Developmental milestones

___ years old when idea for becoming an elite golfer first emerged.

___ years old when first engaged in the regular training of golf.

___ years old when decision was made to become an elite golfer.

___ years old when all available leisure time began being spent on your golf development.

___ years old for first "off season" training camp.

___ years old when you first moved (relocated) to attend regular training in golf.

___ years old when you first established a close and extended relation with a coach.

___ years old when you think that you will retire from golf competitions.

Sports specific milestones

___ years old when you first started playing (not in an organized league).

___ years old when first played in an organized league.

___ years old when first began golf specific training regularly.

___ years old when first began non-golf specific training (aerobic, strength, etc) regularly.

Task 4: Complete Developmental Chart for Maturation and Performance in Golf Chart Two

I would like to summarize the information on the development of your performance in golf. Some of it is related to the information that you gave earlier on your level of competition.

We will start with the first stage of engagement and proceed by column.

You were _____ years old when you first got involved in training for golf.
Please can you provide answers to the following headings in the table-

- Level – For each age indicate the level at which you competed.
- Age of peers – for each age provide the age of the peers you trained/competed with.
- Ranking – for each year, can you provide the highest personal accomplishment/s you may have attained in.
- Height.
- Quality of training resources (0 – 10).
- Injury (unable to train 0 – never had an injury10).
- Physical effort (0 – 10).
- Mental effort (0 – 10).
- Social activities (hours per week involved in social activities – parties, out with friends).

- Individual social (hours per week involved in individual social activities – reading, television).

- School/job (hours per week studying, class time, employment).

- Fun (0 – 10).

Finally, categorize the years discussed into stages in terms of quality and quantity (look for significant stages throughout your development) i.e. years 10 – 13 may be classified as a stage of your development.

Task Five: Development of Relevant Practice Activities in Golf (Chart Three)

For each of the stages listed in the chart can you provide the number of hours per week and number of months per year that you were involved in golf? This includes competitive events and specific training activities for your sport (organized training, competitions, self-initiated training, and individualized instruction).

The following section includes sections for:

- **Related practice activities you engaged in.**

- **The number of hours spent practicing per week.**

- **The intensity of practice.**

- **The number of months per year you were training for each of the relevant practice activities**.

This will be done for each of the stages you previously identified.

Interviewer produces Chart Three: Development of Practice.

Interviewer completes the age and stage columns in accordance to information given in chart two.

Fill in Activities – list all of the activities related to golf during each of the stages. The activities to be listed should encompass both competitive season and off-season.

Fill in Category – now that you have listed all of the activities you participated in at that stage, I would like you, if possible, to categorize these activities in accordance to the following list.

1. Indirect involvement:
E.g. going to watch games, watching TV/video coverage of golf, reading books about golf.

2. Organized games with rules supervised by self and peers:
E.g. game of golf with friends.

3. Organized training supervised by coach(s) or adult(s):
E.g. coach structuring golf activities in practice.

4. Individualized instruction
E.g. private lessons, individualized work with a coach.

5. Self-initiated training
E.g. practicing hitting balls.

6. Organized competition in-group supervised by adult(s)
E.g. league games.

If they have not talked about all of the categories then the following questions should be asked about the categories they didn't mention. These should then be added to the chart.

- Is there any time that you were indirectly involved in golf? If so, what were these activities?

- Is there any time that you participated in organized golf activities that were supervised by self or peers? If so, what were these activities?

- Is there any time when you participated in golf events supervised by a coach or adult? If so, what were these activities?

- Is there any time that you participated in individualized instruction with a coach? Is so, what were the activities?

- Is there any time when you participated in self-initiated training? If so, what were these activities?

Fill in hours per week – please indicate how many hours per week you were participating in this particular activity.

Fill in Months per year – please indicate the number of months per year that you engaging in each activity.

Fill in Physical effort – when people engage in training, their physical effort differs from time to time and from day to day. Can you recall being engaged in an activity when your level of physical effort was maximal? Can you briefly describe that and what it felt like?

I want you to think of that as 100%. At the opposite extreme 1 can engage in training activities and take it easy. I want you to think of that as 0%. I now would like you to go through each activity and rate the average or typical level of physical effort.

I would like you to give a rating for every activity. You will compare the physical effort of that activity to the activity in which you demonstrated 100% maximal effort.

Fill in Mental concentration – when people engage in training, their mental concentration differs from time to time and from day to day. Can you recall being engaged in an activity when your level of concentration was maximal? Can you briefly describe that and what it felt like? I want you to think of that as 100%. At the opposite extreme one can engage in training activities and not being mentally focused. I want you to think of that as 0%. I now would like you to go through each activity and rate

the average or typical level of concentration. I would like you to give a rating for every activity. You will compare the concentration of that activity to the activity in which you demonstrated 100% concentration.

Fill in Fun – I would like you to think of types of activities that were the most fun at the corresponding ages, such as watching your favourite program on TV or playing games with friends. We can all recall participating in activities that were so fun we did not want them to end. Please describe the activity that you would consider most fun for each of the stages you previously identified. These activities don't have to be sport related. Let us set each of these activities as 100% fun. Using these activities as references, go back and give a separate rating for fun in each activity within the stages. Compare each training activity to the activity that you identified as being 100% fun at that stage.

This completes the interview procedure. Thank you for your time and patience in answering the questions posed and filling out each of the three charts.

Notes

Chart One: Early Activities

Activities	Age Started	Age Stopped	Overall Ability When Stopped (0 – 10)	Training Sessions per Week Engaged In	Hours per Session in Activity	Age of Peers you Practiced Played and Competed With	Value of Each Activity in Relation to Enhancing your Performance in Golf (0 – 10)	Reasons to Values Provided

Chart Two: Developmental Chart for Maturation and Performance in Golf

Year	Age	Level	Age of peers you Practiced Played and Competed With	Rank	Height	Quality of Training Resource	Injury	Mental Effort	Physical Effort	Social	Indivi Social	Job/ school	Fun

Chart Three: Development of Relevant Practice Activities

Age	Stage	Activities	Category	Hours per Week	Months per Year	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)

APPENDIX C

C1: Participant Information Sheet

C2: Informed Consent Form

C3: Interview Protocol

C4: Master Table of Super-ordinate and Sub-ordinate Themes

PARTICIPANT INFORMATION SHEET

You are being invited to take part in a research study. Before you decide to take part or not, it's important for you to understand why the research is being undertaken and what commitments it will involve on your behalf. Please take time to read the following information carefully. You are encouraged to ask the researcher any questions or queries that you may have regarding the research.

Purpose of the study
To explore factors which influence the development of expert performance in adolescent golfers.

Why have I been chosen?
You have been classified as an elite adolescent golfer. Specifically, your current handicap score is one or less and you have represented your country at amateur status within the past year.

Do I have to take part?
No, it is entirely up to you to decide whether or not to take part within the study. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You will be free to withdraw your consent and participation from the study at any point before the end of the second interview without the need for giving a reason and with no disadvantage to yourself.

What will happen to me if I take part?
You will participate in **one** interview with the researcher. The interview will comprise a small collection of questions that focus on exploring the meanings that you assign to your own personal experiences throughout your golf career to date. Based upon your responses to the questions, participant specific probes and prompts will be asked.

What do I have to do?
You will be required to think hard and answer all questions within both interview schedules in a detailed manner. The interview is expected to last for **approximately 60 minutes** in duration. Please be aware how although an estimated interview duration is provided, there is no guarantee that this time limit will be strictly adhered too and they may vary in duration between participants. The interview will be terminated once the researcher is satisfied that that all questions posed have been answered in a detailed manner. You are free to refuse to answer any questions within the interview schedule.

What if there is a problem?
Any complaint relating to the way you have been dealt with or treated during the study or any possible harm you might suffer will be addressed accordingly by the researcher. If you have any concerns about any aspect of this study, you should ask to speak with the researcher who will do his best to answer your questions. If you remain unhappy and wish to complain formally, you can do this through the **University Director of Research**, University of Central Lancashire, Preston, Lancashire, PR1 2HE.

Will my taking part in the study be kept confidential?
Yes. All information which is collected about you during the course of the research will be kept strictly confidential. Specifically, interview transcripts will be transcribed verbatim and subjected to interpretative phenomenological analysis, coded and kept

confidential and secure under an anonymous participant number. Only the investigator and supervisor will know which participant corresponds to which number.

What will happen to the results of the research study?
All collated data will be kept in anonymous format to allow any further investigation or critique of the research to take place. Also, any identifying detail from anything that you quote or state (e.g., extracts and quotations) will be removed to ensure anonymity as it's intended that the results of this study, will be published in scientific journals and presented at related conferences. You will be guaranteed a copy of the findings of the study upon completion at your request.

Who has reviewed the study?
The study has been reviewed by the School of Psychology, University of Central Lancashire, Research Ethics Committee.

Contact details
If you require any further information regarding this research project or any of the questionnaires please call Richard Hayman on 01995 642282 or write to:

Mr R. Hayman
Department of Golf, Sport and Leisure
Myerscough College
Bilsborrow
Preston
PR3 ORY
Email: rhayman@myerscough.ac.uk

Or alternatively contact Richard Hayman`s PhD supervisor: **Professor Remco Polman (CPsychol)** Director of Centre for Applied Sport and Exercise Science, The University of Central Lancashire, Preston, PR1 2HE.
Tel: 01772 894467.
Email: RCJPolman@uclan.ac.uk

PARTICPANT CONSENT FORM

Researcher: Richard Hayman MSc (PhD Student within the Centre for Applied Sport and Exercise Sciences, School of Psychology, The University of Central Lancashire).

Research supervisor: **Professor Remco Polman C.Psychol** (Director of the Centre of Applied Sport and Exercise Sciences, School of Psychology, The University of Central Lancashire).

Participants Name:_____

Golf handicap: _____

Gender: Male/Female

Age:_____

Please circle YES or No to questions below:

I fully understand what is involved in taking part in this study?
YES/NO

Have all your questions regarding the research process been clarified?
YES/NO

Is there any part of the research process you feel unhappy about?
YES/NO

I agree to take part in the above study?
YES/NO

Do you understand your rights of withdrawal during any part of the research process?
YES/NO

Any questions I have about the study, or my participation in it, have been answered to my satisfaction?
YES/NO

Signed Participant:_____Date:_____

Signed Researcher:_____Date:_____

Interview Two (IPA)

Focus on capturing and exploring the meanings that participants assign to their own personal experiences.

Introduction to interview two (building rapport).

Before the interview commences, I will engage in a **short** initial rapport building conversation with the participants. **The aim** of this brief discussion will be to ensure that the participants are briefed sufficiently to undertake the interview (e.g., I will provide guidance upon areas that they are encouraged to discuss and they will be allowed to ask any questions or queries that they may have about any aspect of the data collection period).

I will also disclose information explaining my role and responsibilities as a full time Higher Education lecturer within the International Institute of Golf Education at University of Central Lancashire and discuss (general small talk a). how I have a long standing research interest in the attainment of expert performance in numerous sports (specifically golf) b). discuss the potential implications of such research findings regarding the design and structure of future golf developmental pathways within Great Britain and c). discuss the participants current form and recent performances.

I will also explain to all the participants why they have been identified as suitably qualified to participate within the research and provide participation and informed consent forms to be signed.

Question One
Reflecting back over your childhood and adolescence, can you tell me in as much detail as possible how you first became involved in golf?

Question Two
Discuss your golf career starting from when you first experienced golf to the present?

Question Three
What assistance have you experienced in your development as an elite golfer?

Question Four
Discuss the roles of significant others (parents, peers, family, coaches) in your development as a golfer

Question Five
Discuss the role of the environment in your development as a golfer

Question Six
Describe what it was like to focus on golf throughout your childhood and adolescence?

Master Table of Super-ordinate and Sub-ordinate Themes

Impact of Social Influences (4)	**The Pathway Travelled** (9)	**Strategic Approach to Developing Excellence** (4)	**Role of Psychology in Developing Excellence** (4)
The Importance of Fathers in Developing Excellence	Living for Sport	Long Term Career Development Plan	Change of Motivational Orientation
Emergent Role of Mothers in Development	Pleasurable Diversified Sporting Up-bring	Considered use of Resources	Learning from Errors
Peripheral Involvement of Extended Family	Participant Led Development	Emergence of Networking Skills	Role of Praise and Recognition of Achievement
Family Game Culture	Influence of Environment upon Developmental Opportunities	Contingency Plan	Role of Critical Reflection in Development
	Golf Identified as an Opportunity to Demonstrate Competence		
	The Importance of Deliberate Practice Post 16		
	Balance of Power with Coaches		
	Non-Linear Development Pathways		
	Sacrifices made to Pursue Excellence		

APPENDIX D

D1: Participant Information Sheet

D2: Informed Consent Form

D3: Diary Log

D4: Baseline and Intervention Data

D5: Social Validation Interview Schedule

D6: Follow-up Interview Schedule

PARTICPANT INFORMATION SHEET

You are being invited to take part in a research study. Before you decide to take part or not, it is important for you to understand why the research is being undertaken and what commitments it will involve on your behalf. Please take time to read the following information carefully. You are encouraged to ask the researcher any questions or queries that you may have regarding the research.

Purpose of the study
To investigate the effects of a golf specific (specifically short game putting) deliberate practice intervention upon golf performance of aspiring elite adolescent golfers.

Why have I been chosen?
You are classified as an aspiring elite adolescent golfer. Specifically, your current handicap score is four or less, you are aged between 16 and 18, you are a member of the Uclan Golf Development Squad and you have represented your county at amateur status within the past year.

Do I have to take part?
No, it's entirely up to you to decide whether or not to take part within the study. If you do, you will be given this information sheet to keep and be asked to sign a consent form. You will be free to withdraw your consent during any stage of the study without providing a reason and with no disadvantage to yourself.

What will happen to me if I take part?
You will participate within a 13 week study investigating the effects of a golf specific deliberate practice intervention upon short game putting performance. This study will generate both quantitative (i.e. performance data in weekly skills tests and retrospective diary log data) and qualitative (i.e. social validation interviews) data during baseline and intervention phases.

What do I have to do?
You will initially perform a baseline period where you will undertake normal training and competition regimens. Then the intervention (deliberate practice) will be introduced which will require you to undertake four 30 minute deliberate practice sessions specific to short game putting per week. After each session, you will complete a retrospective diary log by stating how long each session lasted and a rating out of ten regards how much physical and mental effort you exerted and how much fun you experienced. During each week of the study during baseline and intervention stages, you will undertake the same putting test with all scores recorded and stored by the researcher. Finally, once the study has finished, you will take part in a short interview that will last approximately 30 minutes that will ask a range of questions about how the study has affected you and your golf performance.

What if there is a problem?
Any complaint relating to the way you have been dealt with or treated during the study or any possible harm you might suffer will be addressed accordingly. If you have any concerns about any aspect of this study, you should ask to speak with the researcher who will do his best to answer your questions.

Will my taking part in the study be kept confidential?
Yes. Inclusion within this study is voluntary and all data will remain confidential. The lead researcher and supervisory team members are the only individuals who will have access to your data. Once the data collection period is complete, all data will be stored upon a private computer that only the investigator and supervisory team have access to.

What will happen to the results of the research study?
All data will be kept in anonymous format to allow any further investigation or critique of the research to take place. It is intended that the results of this study will be published in scientific journals. You will be guaranteed a copy of the findings of the study upon completion at your request.

Who has reviewed the study?
The study has been reviewed by the School of Psychology, University of Central Lancashire, Research Ethics Committee.

Contact details
If you require any further information regarding this research project or any of the questionnaires please call Richard Hayman on 07813 029666 or write to:

Mr R. Hayman
Centre for Applied Sport and Exercise Science
The University of Central Lancashire
Preston
PR1 2HE
Email: RHayman@uclan.ac.uk

Or alternatively contact Richard Hayman`s PhD supervisor: **Dr Jamie Taylor,**
Course Leader BSc (Hons) Sport Science, The University of Central Lancashire, Preston, PR1 2HE.
Tel: 01772 894467.
Email: JATaylor2@uclan.ac.uk

PARTICIPANT CONSENT FORM

Researcher: Richard Hayman MSc (PhD Student within the Centre for Applied Sport and Exercise Sciences, School of Psychology, University of Central Lancashire).

Research supervisor: **Dr Jamie Taylor (**Course Leader BSc (Hons) Sport Science, The University of Central Lancashire, School of Psychology, The University of Central Lancashire).

Participants Name:_____

Golf handicap: _____

Gender: Male/Female

Age:_____

I understand that I am taking part in a study undertaken by Richard Hayman to examine the influence of a deliberate practice intervention on sub components of golf performance. To ensure anonymity, you will be assigned a number to protect your personal information and all data will be stored in a locked office to which only the lead researcher has access. Data will be retained for a period of five years post publication, after which they will be destroyed. You will possess the contact details of the lead researcher and understand you are encouraged to contact him with any questions or concerns you may have during the study.

Please circle YES or No to questions below:

I fully understand what is involved in taking part in this study?
YES/NO

Have all your questions regarding the research process been clarified?
YES/NO

Is there any part of the research process you feel unhappy about?
YES/NO

I agree to take part in the above study?
YES/NO

Do you understand your rights of withdrawal during any part of the research process?
YES/NO

Any questions I have about the study, or my participation in it, have been answered to my satisfaction?
YES/NO

Signed Participant:_____Date:_____

Signed Researcher:_____Date:_____

The Effects of Deliberate Practice on Golf Performance

NAME:

Richard Hayman
University of Central Lancashire
Centre for Applied Sport and Exercise Sciences
E-mail: rhayman@uclan.ac.uk

Weekly Assessments

Putting Test
You will undertake one putting test each week (round the world). This task will comprise ten shots and a point will be awarded if a put is successfully holed. Maximum and minimum scores achievable on the task are ten and zero respectively.

Deliberate Practice Intervention:
Considerable attempts have been made by the lead researcher and Head Professional golf coach to assemble a collection of practice schedules that reflect deliberate practice activities. Therefore, and in accordance with deliberate practice theory, engagement within these practice activities requires sustained effort and attention. Also, they should not necessarily be enjoyable to undertake, are structured to improve current performance and performed solely for the purpose of performance enhancement rather that enjoyment.

Putting: The ladder
Set up – one hole, ten puts in total (one shot at each specified distance) will be made each at varying distances from the hole. You will start the practice session by taking a shot at 3 ft from the hole. They will then move back 3ft each shot (e.g. playing shots at 3, 6, 9, 12, 15, 18, 21, 24, 27 & 30 ft respectively). The aim of the practice session is to put the ball in the hole. If successful, you will be awarded two points. If the ball misses the hole but stops less than 18 inches behind the hole, one point is awarded. If the ball stops more than 18 inches past the hole, zero points are awarded. If the ball falls short of the hole, the participant receives a score of -1. The maximum score achievable is 20. The lowest score achievable is minus ten.

Additional information:
You will undertake the deliberate practice intervention on four occasions during each week of the intervention. You will use your own putter and balls during practice sessions. The lead researcher and head professional coach will demonstrate each practice drill to you during the baseline phase of the study (including details of measurements from the hole the ball is to be played). The head professional will demonstrate the weekly testing activities during induction week in September 2010. You will be required to undertake two weekly practice sessions during your own time. The other two sessions will be undertaken during coaching days at Myerscough College under the guidance of the golf coaching team. All tests will be completed at Myerscough College utilising the extensive golf facilities available.

Stages of Deliberate Practice Intervention

Introduction to study week commencing 13th September 2010.

Week 1: commencing 20th September 2010.

Week 2: commencing 27th September 2010.

Week 3: commencing 4th October 2010.

Week 4: commencing 11th October 2010.

Week 5: commencing 18th October 2010.

Week 6: commencing 25th October 2010.

Week 7: commencing 1st November 2010.

Week 8: commencing 8th November 2010.

Week 9: commencing 15th November 2010.

Week 10: commencing 22nd November 2010.

Week 11: commencing 29th November 2010.

Week 12: commencing 6th December 2010.

Week 13: commencing 13th December 2010.

Week	Participants				
	1	2	3	4	5
1	Baseline	Baseline	Baseline	Baseline	Baseline
2	Baseline	Baseline	Baseline	Baseline	Baseline
3	Baseline	Baseline	Baseline	Baseline	Baseline
4	Baseline	Baseline	Baseline	Baseline	Baseline
5	Baseline	Baseline	Baseline	Baseline	Baseline
6	**Intervention**	Baseline	Baseline	Baseline	Baseline
7	**Intervention**	**Intervention**	Baseline	Baseline	Baseline
8	**Intervention**	**Intervention**	**Intervention**	Baseline	Baseline
9	**Intervention**	**Intervention**	**Intervention**	**Intervention**	Baseline
10	**Intervention**	**Intervention**	**Intervention**	**Intervention**	**Intervention**
11	**Intervention**	**Intervention**	**Intervention**	**Intervention**	**Intervention**
12	**Intervention**	**Intervention**	**Intervention**	**Intervention**	**Intervention**
13	**Intervention**	**Intervention**	**Intervention**	**Intervention**	**Intervention**

Diary Log

Using the ratings scale provided, please take time to consider the amounts of physical and mental effort you placed into the putting practice today. Also, please provide a score for the amount of fun you encountered. Complete the tables provided. Check to make sure you have answered all items appropriately.

Date	Deliberate Practice Session	Start Time	End Time	Physical Effort (0-10)	Mental Effort (0-10)	Fun (0-10)
Example: 11/10/2010	21	14.15	14.30	8	9	8
	1					
	2					
	3					
	4					
	5					

	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					

	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					

	25					
	26					
	27					
	28					
	29					
	30					
	31					
	32					

Week No		Participant Test Scores								
	1	Score	2	Score	3	Score	4	Score	5	Score
1	Baseline		Baseline		Baseline		Baseline		Baseline	
2	Baseline		Baseline		Baseline		Baseline		Baseline	
3	Baseline		Baseline		Baseline		Baseline		Baseline	
4	Baseline		Baseline		Baseline		Baseline		Baseline	
5	Baseline		Baseline		Baseline		Baseline		Baseline	
6	**Intervention**		Baseline		Baseline		Baseline		Baseline	
7	**Intervention**		**Intervention**		Baseline		Baseline		Baseline	
8	**Intervention**		**Intervention**		**Intervention**		Baseline		Baseline	
9	**Intervention**		**Intervention**		**Intervention**		**Intervention**		Baseline	
10	**Intervention**		**Intervention**		**Intervention**		**Intervention**		**Intervention**	
11	**Intervention**		**Intervention**		**Intervention**		**Intervention**		**Intervention**	
12	**Intervention**		**Intervention**		**Intervention**		**Intervention**		**Intervention**	
13	**Intervention**		**Intervention**		**Intervention**		**Intervention**		**Intervention**	

Subjective Ratings Scale

Using the scale below, rate the amount of mental effort, physical effort and fun experienced during the activity.

0 – Very, very low

1 –

2 – Fairly low

3 –

4 – Moderate

5 –

6 – High

7 –

8 – Very High

9 –

10 – Very, very high

Demographic Information

Age:

Gender:

Years of competitive golf experience:

Ability (handicap) and highest level of current competition:
Currently:
Age 12:
Age 13:
Age 14:
Age 15:
Age 16:
Age 17:
Age 18:

Family structure (traditional, single parent):

Number of siblings:

Education:

Geographical location:

Main reason I started playing golf was because……..

Social Validation Post Intervention Interview Questions

1). Has the deliberate practice intervention proved useful to you?

2). Did you follow the prescribed intervention as instructed?

3). Were there any beneficial aspects of the deliberate practice intervention?

4). Were there any negative aspects of the deliberate practice intervention?

5). Will you engage with deliberate practice in the future?

6). How did the deliberate practice putting and chipping activities differ from your usual short game practice drills?

7). How important is an improvement in performance to you?

8).How satisfied were you with the outcomes of the deliberate practice training Programme?

Study Four Demographic Participant Information

Participant	Date of Birth	Fathers Profession	Number of Siblings	Education: GCSE Grades	Born	Raised	Primary Motive to Play Golf
1		Own Company	1 Brother (20) County golfer	1B,5C,1D	Billinge, Wigan	Billinge, Wigan	Influence of Father
2		Own Engineering Company		1B, 6C,2D	Bedale, N.Yorkshire	Bedale N.Yorkshire	Influence of Father
3		Golf Company (Tour Operator)	1 Brother (20)	N/A	London	Spain (from age 9-16)	Influence of Father/Grandad
4		Factory Worker		5C	Fleetwood	Fleetwood	Influence of Father
5		Own Company	1 Sister (18)	6C,4D	Melling, Liverpool	Melling, Liverpool	Influence of Father

Study Four Follow Up Interview Questions

1). Discuss your progression in terms of performance over the past five months?

2). Reflecting back on your participation in the golf putting study five months ago, what are your thoughts now?

3). We found that the deliberate practice schedule was beneficial to your putting performance. How did you experience this?

4). Have you persisted to use this form of practice in the last five months? If yes why? If not why?

5). What are your general thoughts about practising golf in this way?

6). Discuss the nature of your practice regimes over the past five months?

7). What barriers have you faced whilst undertaking deliberate practice on a daily/regular basis?

8). What barriers have you faced that have prevented you from undertaking deliberate practice in the last five months?

9). What assistance have you experienced that has allowed you to undertake deliberate practice in the last five months?

10.) Discuss the role of the environment (e.g. facilities, coaching philosophy) in your ability to undertake daily deliberate practice regimes.

11.) Discuss the roles of significant others (friends, family, coach) in your development as a golfer during the past five months

APPENDIX E

Publications Emanating from Thesis

Peer Reviewed Publications

Hayman, R., Polman, R., Taylor, J., Hemmings, B., & Borkoles, E. (2010). The development of elite adolescent golfers. Abstract In *Proceedings of the 2010 British Psychological Society: Sport and Exercise Psychology Conference* (p.66), London: United Kingdom.

Hayman, R., Polman, R., Taylor, J., Hemmings, B., & Borkoles, E. (2011). The development of elite adolescent golfers. *Talent Development and Excellence*. 3, 249-261.

Hayman, R., Polman, R., & Taylor, J. (in press). The validity of retrospective recall in assessing practice regimes in golf. *International Journal of Sport and Exercise Psychology*.

Selected List of Conference Presentations

Hayman, R., Polman, R., & Taylor, J. (2011). The effect of a deliberate practice intervention upon short game putting performance of aspiring elite golfers. *Paper presented at the School of Psychology Postgraduate Research Symposium* (University of Central Lancashire, May 2011).

Hayman, R., Polman, R.., Taylor, J., & Borkoles, E., & Hemmings, B. (2011). The development of elite adolescent golfers. Abstract in *Proceedings of the 2nd English Golf Union Coaching Conference* (Lincoln, January 2011).

Hayman, R., Polman, R., Taylor, J., & Borkoles, E., & Hemmings, B. (2010) Developmental factors experienced by elite level adolescent golfers. *Paper presented at the 5th Myerscough College Annual International Research Conference*. (November 2010).

Hayman, R., Polman, R., & Taylor, J. (2010). A longitudinal analysis of sub elite adolescent golfer's practice and competition histories. *Paper presented at the 5th Myerscough College Annual International Research Conference*. (November 2010).

Papers under Review (as of August 2012)

Hayman, R., Polman, R., Borkoles, E., & Taylor, J. (under review). The influence of deliberate practice upon performance and practice behaviours of aspiring elite adolescent golfers. (submitted to *Psychology of Sport and Exercise,* June 2012).

Hayman, R., Polman, R., Taylor, J., Hemmings, B., & Borkoles, E. (under review). The lived experiences of elite adolescent golfers. (Submitted to *Qualitative Research in Sport, Exercise and Health*, July 2012).